MWH

BUILDING A BETTER WORLD

May 14, 2010

Mr. Dave Tomten
US Environmental Protection Agency
1435 N. Orchard Street
Boise, ID 83706

RE: Transmittal of Final 2010 Groundwater Monitoring Memorandum - Revision 2

Dear Dave:

This letter transmits the final *2010 Groundwater Monitoring Memorandum - Revision 2*. This final version of the document addresses the four additional minor comments included in the A/T's conditional approval letter, dated May 13, 2010.

The document has been revised to address the A/T's first and third comments as suggested. With regards to the A/T's second and fourth comments, the text on pages 4 and 6 has been revised to further discuss sampling at MMW012 and MBW112 should groundwater be present. As stated in the revised text, alluvial monitoring well MMW012 and alluvial direct-push borehole well MBW112 have never had sufficient water in them for sampling or development. Given the low snow pack and runoff in 2010, there is no reason to believe that they will contain groundwater this year either. However, the water level in the monitoring wells will be checked. If groundwater is present in either of these wells, the height of the water column in the well will be determined, and the wells will be purged. If the wells recover following purging, the field team will contact the P4 and MWH project managers who will then contact the A/T. In consultation with the A/T, it will be determined if the wells should be sampled and for what analytes. This decision will be based in part on how much water is in the well (e.g., could more than one sample bottle be filled), observed turbidity, recovery, and etc. As this is the final version of the memorandum, these changes to the memorandum have not been underlined.

We are submitting these documents both electronically and hardcopy per the CO/AOC and subsequent agreements between the A/T and P4 Production. We have appreciated your timely review of the draft memorandum and comment responses. P4 anticipates sampling to begin as early as May 15. Should you have any questions, please contact Barry Koch at (208)547-1439.

Best Regards,

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Spring MSG005 at Ballard Mine

P4 PRODUCTION

2010 GROUNDWATER MONITORING MEMORANDUM

Final

Prepared by

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MWH

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May 2010

2010 GROUNDWATER MONITORING MEMORANDUM

Final
Revision 2

May 14, 2010

Prepared by:

MWH AMERICAS, INC.

Prepared for:

P4 PRODUCTION, LLC

TABLE OF CONTENTS

LIST OF TABLES (at end of document)

LIST OF DRAWINGS

APPENDICES

ACRONYMS AND ABBREVIATIONS

A/T	Agencies and Tribes
BLM	United States Bureau of Land Management
COPC	constituent of potential concern
CO/AOC	Administrative Settlement Agreement and Order on Consent/Consent Order
DOI	Department of the Interior
DQO	data quality objective
ER	equipment rinsate blank
FSP	Field Sampling Plan
HSP	Health and Safety Plan
IDEQ	Idaho Department of Environmental Quality
MWH	MWH Americas, Inc.
P4	P4 Production, LLC
QAPP	Quality Assurance Project Plan
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
SAP	Sampling and Analysis Plan
SEGW	surface expression of groundwater
SOP	standard operating procedure
USEPA	United States Environmental Protection Agency
USFS	United States Forest Service

1.0 INTRODUCTION

This memorandum describes the relevant components for the 2010 groundwater monitoring program at the P4 Production, L.L.C. (P4) mines near Soda Springs, Idaho. This memorandum was prepared by MWH Americas, Inc. (MWH) on behalf of P4 Production, LLC (P4), in accordance with the requirements of the Administrative Settlement Agreement and Order on Consent/Consent Order for Remedial Investigation/Feasibility Study (2009 CO/AOC; USEPA, 2009). The 2009 CO/AOC is a voluntary agreement between P4 and the United States Environmental Protection Agency (USEPA), the Idaho Department of Environmental Quality (IDEQ), the United States Department of Agriculture, Forest Service (USFS), the U.S. Department of the Interior (DOI), Bureau of Land Management (BLM), the Shoshone-Bannock Tribes (Tribes), collectively referred to as the "Agencies and Tribes" or A/T. This memorandum will be included as a component of the Remedial Investigation/Feasibility Study Work Plan (RI/FS Work Plan) that supports the comprehensive mine-specific RI/FS that will be conducted at P4's three historic phosphate mines namely Ballard, Henry and Enoch Valley Mines (collectively, the "Sites").

Characterization of groundwater at the Sites has been conducted in a phased approach since 2004. Ongoing monitoring of contaminants of potential concern (COPC) concentrations and piezometric conditions in monitoring wells and specific seeps and springs is needed to complete characterization of the nature and extent of COPCs in groundwater. The groundwater data collected under this plan will support the RI/FS evaluation and refinement of the hydrogeologic conceptual models of the Sites.

As the substantive components of the 2010 groundwater monitoring program, including the Data Quality Objectives (DQOs) and methods and procedures are the same as the 2009 groundwater monitoring program, the complete components of an Sampling and Analysis Plan (SAP) are not included in this memorandum. The reader is referred to the *2009 Groundwater Monitoring Sampling and Analysis Plan* (*2009 Groundwater SAP;* MWH, 2009a) for the DQOs as well as the field sampling plan (FSP), quality assurance project plan (QAPP), and health and safety plan (HSP).

Similar to the *2009 Groundwater SAP,* P4 considered the following categories of groundwater monitoring locations: (1) monitoring wells, (2) direct push borehole monitoring wells, (3) production/domestic/agricultural wells, and (4) surface expressions of groundwater (SEGW) (e.g., dump seeps, springs, and streams) for 2010 monitoring. The categories were evaluated for spatial and analytical adequacy to characterize groundwater, as well as the amount of available data collected from 2004 onward.

2.0 LOCATION SELECTION

The spatial/categorical relevance of groundwater monitoring locations was evaluated. The purpose of this evaluation was to determine if various groundwater features, in close proximity, had similar chemical results. Based on the evaluation performed on the 2009 sampling data and the screening performed in the *2009 Groundwater SAP,* P4 recommends retaining or excluding the following locations, by category as discussed in the subsections below. Drawing 1 shows the water sampling locations for each of the mine sites. In addition, Table 1, *2010 Groundwater Monitoring Locations, Frequency, and Schedule* (replaces Table 3-1 from the *2009 Groundwater FSP*), lists the mine site followed by the locations to be sampled, and the year the wells were installed.

2.1 Monitoring Wells

P4 will sample MMW--- locations in 2010 except for the wells excluded as shown on Table 1. Water level measurements will continue to be collected from all MMW--- wells during the spring and fall 2010. Wells that have been replaced by new monitoring wells (e.g., MMW001) will also be excluded from sampling as well as from water level measurements. Wells MW-15A and MW-16A will be sampled at the Ballard Mine. These two wells were installed for the Blackfoot Bridge Environmental Impact Study baseline data collection program but are incorporated into the groundwater monitoring program for the RI/FS as of 2009 sampling events. Any wells installed in 2010 as part of the RI/FS process, will be sampled in fall 2010 after well development.

Several monitoring wells have been excluded from sampling in 2010. In general continued sampling of a monitoring well was not recommended if it was redundant (in the same flow path as another well), has been consistently dry, had a sufficiently long sampling record in location that was not impacted by the Sites, or would not be expected to vary during the period of the RI. The justification for excluding the specific monitoring wells is as follows:

MMW004: Monitoring well MMW004 is an old open borehole and steel cased well in the northern portion of the Henry Mine. It has been monitored since October 2004 during six sampling events. The selenium concentration has consistently been measured as being between 0.002 and 0.00273 mg/L, with one event having selenium not detected at 0.001 mg/L. Sulfate has also exhibited a narrow range of results over the six year period being between 112 and 137 mg/L. Concentrations over approximately 200 mg/L sulfate are typical but not conclusive of groundwater impacted by waste rock dump seepage. The data from this monitoring well are adequate for the RI/FS, and it is reasonable to assume the concentration will not be significantly different in 2010. Therefore, sampling was not recommended.

MMW014: Alluvial monitoring well MMW014 at the Henry Mine has been sampled during four monitoring events. The total selenium concentration has ranged from not detected at 0.001 mg/L to 0.00203 mg/L. The maximum sulfate concentration has been 61.9 mg/L. MMW014 is located very close to the toe of waste rock dump MWD090. Given the age of the waste rock dump, if there is an impact from the dump, it would have been observed in MMW014. Sufficient data have been collected from MMW014 for the RI/FS, and further sampling was not recommended.

MMW019: Monitoring well MMW019 at the Henry Mine is installed in shallow Phosphoria Formation. The maximum total selenium concentration from four sampling events has been 0.00541 mg/L and the maximum sulfate concentration 159 mg/L. Having been installed in the shallow Phosphoria Formation, which is not a key unit being characterized and not apparently impacted by the Henry Mine, further sampling is not recommended.

MMW008: Monitoring wells MMW007 and MMW008 are in the same hydrostratigraphic unit at the southern end of the Enoch Valley Mine (the upper weathered Dinwoody Formation/alluvial system). Neither monitoring well has produced groundwater samples suggestive of groundwater impacts from the mine. The maximum total selenium concentration measured in MMW008 was 0.00138 mg/L (four sampling events). Concentrations in MMW007 have been slightly higher with a maximum of 0.005 mg/L. With MMW007 in the same flow path and closer to the mine waste dump (the potential source), sampling of monitoring MMW008 is not necessary. It would become necessary if an impact in MMW007 was indicated.

MMW012: Alluvial monitoring well MMW012 is located at the Enoch Valley Mine and has never had sufficient water in it for sampling or development. Given the low snow pack and runoff in 2010, there is no reason to believe that it will contain groundwater this year either. However, the water level in the monitoring well will be checked. If groundwater is present in MMW012, the height of the water column in the well will be determined, and the well will be purged. If the well recovers following purging, the field team will contact the P4 and MWH project managers who will then contact the A/T. In consultation with the A/T, it will be determined if the well should be sampled and for what analytes. This decision will be based in part on how much water is in the well, observed turbidity, recovery, and etc.

MMW024: Monitoring wells MMW024 and MMW034 are in the same flow path at the Enoch Valley Mine. Both are Dinwoody Formation monitoring wells downgradient of waste rock dump MWD092. MMW034 is further downgradient from MMW024, which was installed adjacent to MWD092. Both monitoring wells have indicator parameters suggestive of impacts from the mine site. Selenium in MMW024 has been measured at 0.0137 and 0.0243 mg/L in May 2008 and September 2009, respectively. Measured selenium concentrations in the more downgradient MMW034 are actually a little higher at 0.0762 mg/L (September 2009). It appears that the plume of impacted groundwater has extended well beyond MMW024 to the area of MMW034. Sampling both of these closely placed monitoring wells in the same flow path during every event is not necessary, and MMW034 is further downgradient and has only been sampled once. Therefore, MMW024 has been dropped from the 2010 sampling.

MMW026: This monitoring well at the Enoch Valley Mine has been sample twice, once in September 2008 and then in May 2009. The concentrations of analytes that may suggest an impact from the Enoch Valley Mine were low and relatively invariant between the two events. For example, sulfate which is almost always elevated in mine-impacted groundwater was reported as 19.5 and 19.7 mg/L in May 2008 and September 2009, respectively. Total selenium measured in MMW026 was 0.0013 and 0.00107 mg/L in May 2008 and September 2009, respectively. Cadmium was not detected in either monitoring event. This monitoring well is key location for long-term monitoring of the Wells Formation and the Enoch Valley mine and will need to be sampled periodically. However, given the low concentrations and relatively consistent concentrations of the key indicator parameters, sampling in 2010 for the RI/FS appears unnecessary. Sampling in 2011 is suggested and that the monitoring well be included in a long-term monitoring program. However, the sampling frequency could be every other year so long as indicator parameters do not indicate an increasing trend.

2.2 Direct Push Borehole Wells

This groundwater monitoring category for 2010 includes the existing direct push borehole monitoring wells (pre-pack wells) installed during the 2008 and 2009 direct push groundwater investigation. At Ballard Mine, MBW006, -009, -011, -027, -028, -032, -048, -130, -131, and -135 will be monitored. At Enoch Valley Mine, MBW085, -087, -099, -107, will be monitored and at Henry Mine, MBW152 will be monitored.

Two direct push locations were excluded from sampling in 2010. One location that was excluded was where the location is redundant with another, and the well is positioned such that the data are not important to the RI. The second condition was where the well has been consistently dry. The following provides specific information on the locations excluded:

MBW026: This direct-push monitoring well at the Ballard Mine appears to be providing data redundant with co-located MBW027. The May 2009 selenium concentrations from MBW026 and MBW027 were 0.221 and 0.210 mg/L respectively. Water levels in these were approximately 1.3 feet different. Despite being installed at slightly different depths, the two

monitoring wells appear to be monitoring the same hydrostratigraphic horizon and the same water quality. Further sampling of MBW026 was not recommended. It should be noted that this location also includes a deeper co-located conventional monitoring well, MMW017, which does appear to be monitor a separate portion of the alluvial system and has a slightly different water quality.

MBW112: This direct-push monitoring well has consistently been dry or not produced sufficient water to be sampled or developed. The water level will be checked in 2010. In all likelihood this location should be abandoned. If groundwater is present in MBW112, the height of the water column in the well will be determined, and the well will be purged. If the well recovers following purging, the field team will contact the P4 and MWH project managers who will then contact the A/T. In consultation with the A/T, it will be determined if the well should be sampled and for what analytes. This decision will be based in part on how much water is in the well, observed turbidity, recovery, and etc.

2.3 Production, Agricultural, and Domestic Wells

P4 excluded these wells (MPW-, MAW-, and MDW-) from the 2009 monitoring program and they will again be excluded from the 2010 monitoring program. P4 has a record of several sampling efforts for these locations and previous screening evaluations show no selenium exceedances in these production wells. Refer to Drawing 1 for the location of these wells.

2.4 Dump Seeps, Springs, and Streams

P4 will continue to monitor dumps seeps MDS025, -026, -030, and -034. Dumps seeps MDS025 and MDS026 at Enoch Valley Mine, show exceedances of selenium and other analytes. Additionally, MDS030 will be used as a surrogate for MDS031—033. P4 will continue to monitor MDS034 due to limited water quality data at this location.

P4 will continue to monitor MSG004—007. MSG001—003 will be excluded from future monitoring because P4 has a record of several sampling events for these locations. MSG001 and MSG002 have shown no selenium exceedances. P4 has monitored MSG003 seven

times to date. MSG008, Hayfield Pipe, will not be monitored in 2009 because P4 believes this water to be from the same source as MST069, Short Creek, which is scheduled for continued monitoring under this groundwater plan and under the surface water monitoring program as described in the *2009 and 2010 Surface Water Monitoring Sampling and Analysis Plan* (*2009 Surface Water SAP;* MWH, 2009b). MSG008 also empties into the Short Creek channel, south of the haul road.

P4 will continue to monitor MST096 at Ballard mine as this location represents the easternmost monitoring point for the southeast plume at MWD082. In addition, location MST136 and MST144 at Enoch Valley will also be monitored to evaluate potential impacts from MWD092. Surface expressions of groundwater (headwater stream locations) were also evaluated for future performance monitoring in the *2009 Surface Water SAP*.

3.0 ANALYTE SELECTION

The analyte selection below presents the proposed analyte list for 2010 groundwater monitoring in Table 2, *2010 Groundwater Proposed Analyte List* (replaces Table 3-3 from the *2009 Groundwater SAP*) and Table 3, *Groundwater Analytical Summary* (replaces Table 4-3 from the *2009 Groundwater FSP*). Based on IDEQ and USEPA guidance, only unfiltered or total fractions will be analyzed for metals. While dissolved metal fractions have been measured in the past and are more useful for geochemical evaluations, they are not directly comparable to applicable IDEQ and USEPA screening benchmarks for groundwater. At this time, P4 believes that sufficient dissolved fraction metals data from a sufficient number of wells is available to make geochemical interpretations.

In direct-push boreholes, where samples "appear" to be non-turbid (<5 NTU), P4 will collect replicate samples for both total and dissolved analyses. However, if there is not enough water in the well, samples will be collected for total analyses only. In direct-push boreholes where turbidity is factor (>5 NTU), then samples will be collected for dissolved analyses (filtered) only.

Based on this direction, the proposed analytes for the 2010 groundwater monitoring are listed in Table 2. Further discussion of the analyte list, by groundwater monitoring location type is given below. In addition to the recommended analytes, P4 will also take physical water quality parameters including:

- pH
- Specific Conductivity;
- Dissolved oxygen;
- Oxidation/Reduction Potential;
- Turbidity; and
- Temperature.

3.1 2009 Monitoring Wells

The expanded analyte list (see Table 2) will be collected for the spring 2010 sampling event for the monitoring wells constructed in 2009. These wells were sampled for the regular analyte list in fall 2009 with the assumption that they would be sampled for the expanded analyte list in spring 2010. If any wells installed in 2009 require sampling in fall 2010 based on the seasonal evaluation described in Section 4.0, the wells would be sampled for the primary analyte list. The expanded analyte list was presented in Table B-3 from Appendix B, *2008 Phase IIb Monitoring Well Installation Technical Memorandum - Final,* dated April 2008 (MWH, 2008) with the exception of orthophosphate and ferrous/ferric iron. A copy of this table (Table B-3) is included in the tables section.

3.2 2008 & Older Monitoring Wells and Direct Push Borehole Wells

The 2008 and older monitoring wells and direct push borehole monitoring wells have been sampled for the expanded and regular analyte list in the past. The direct push borehole wells were sampled in 2009 for the regular list (presented in Table B-3 from Appendix B, *2008 Phase IIb Monitoring Well Installation Technical Memorandum - Final,* dated April 2008 [MWH, 2008]). The 2008 monitoring wells were sampled for the expanded list in 2009, and the 2007 and older monitoring wells were sampled for comprehensive list of parameters in 2008 and earlier events. Based on the 2009 sampling results as well as screening results presented in the *2009 Groundwater SAP,* isolated exceedances occurred for a few constituents. However,

several exceedances were reported for Se, SO_4, TDS, and occasionally Cd when evaluated against primary and secondary screening benchmarks. Due to low numbers of isolated exceedances as well as low factors of exceedance, P4 proposes to sample 2008 and older monitoring wells as well as direct push borehole wells for Se, Cd, SO_4, and TDS (primary analyte list). This includes MMW009, this well has previously been sampled for the expanded analyte list, and screening against primary and secondary screening benchmarks has shown one exceedance of lead in 2008 (below lead standard in both 2007 and 2009) as well as exceedances of aluminum, iron, and manganese (regional background concerns). Based on this screening, MMW009 will be analyzed for the primary list in 2010, in addition to total lead. Metals analysis will be analyzed from the unfiltered, total fraction, unless excessive turbidity is encountered in the well (e.g., direct push borehole wells – total and dissolved analysis based on turbidity).

3.3 Potential Wells Installed in 2010

Wells that may be installed in 2010 as part of the RI/FS will be sampled for the regular analyte list (see Table 2). The regular analyte list is the non-asterisked analytes presented in Table B-3 from Appendix B, *2008 Phase IIb Monitoring Well Installation Technical Memorandum - Final,* dated April 2008 (MWH, 2008) with the exception of orthophosphate and ferrous/ferric iron. However, chromium will also be included in the analyte list for these potential 2010 wells. These wells may be sampled for the expanded list in future sampling events as indicated in future planning documents.

3.4 Production, Agricultural, and Domestic Wells

As discussed in Section 2.3, above, these wells were not sampled in 2009 and will not be sampled in 2010.

3.5 Dump Seeps, Springs, and Streams

The seep, spring, and stream analytes were selected based on screening performed in the *2009 Surface Water SAP* and *2009 Groundwater SAP*. Only five analytes showed any exceedances after primary and secondary screening. Total and dissolved fractions at seeps,

springs, and streams will be analyzed because these locations can also be evaluated as surface water (see Table 2). Stream stations MST136 and MST069 will be sampled under both the groundwater and surface water program. This will require that the stations be sampled for slightly different suites and different fractions of analytes as required by both programs. In addition to the groundwater analytes, MS069 and MST136 will be sampled for the following per the 2009 and 2010 Surface Water Monitoring Sampling and Analysis Plan (MWH, 2009b):

- Dissolved iron, potassium, sodium, vanadium, and zinc
- Alkalinity
- Hardness

4.0 SEASONAL SAMPLING EVALUATION

Based on A/T direction, P4 evaluated historic spring and fall selenium and sulfate data as detailed in the *2009 Groundwater SAP*. This evaluation supported the decision to sample some stations in the fall as well as the spring. The following locations were sampled in fall 2009 and will also be sampled again in fall 2010 based on the rationale provided below:

- Historic samples results are higher in the fall than the spring and exceed either the selenium or sulfate water quality criteria:
    - MDS026
    - MDS030
    - MMW010
    - MMW013
    - MMW029
    - MST069
- Fall samples results have never been collected and available spring data samples exceed the selenium or sulfate water quality criteria:
    - MDS025
    - MDS034
    - MST144

- Historic samples results are higher in the fall than the spring but are below either the selenium or sulfate water quality criteria:
    - MSG004

In addition, MST069 will be sampled under both the surface water and groundwater monitoring programs as stated in the *2009 Surface Water SAP*. It is also noted that if the pending spring 2010 data is significantly lower than the fall 2009 data for wells installed in 2009, then additional wells (e.g., MMW034 and MMW035) will be included in the fall 2010 sampling program. Tables 4 to 9 provide sampling tracking information for both the spring and fall locations and analyte lists. Table 10 provides the results for the 2009 groundwater sampling event.

5.0 SAMPLE COLLECTION AND ANALYSIS

In 2010, samples will be analyzed for the groundwater parameters presented in Table 3, *Groundwater Analytical Summary*. Microbac of Marietta, Ohio will analyze for all parameters listed according to the methods and procedures outlined in the *2009 Groundwater SAP*. Monitoring well samples will be collected using the protocols outlined in SOP-NW-5.3, *Collection of Groundwater Quality Samples* and the SOP *Low Stress Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells* and surface water samples will be collected according to SOP-NW-9.1, *Collection of Surface Water Samples*. All required SOPs are the same as those followed during 2009 and these SOPs provided in the *2009 Groundwater SAP*. The following QA/QC procedures will be followed during sampling, with changes from 2009 noted below:

- Collection of field replicate samples will occur at a minimum rate of 5 percent of total stations, compared to a rate of 10 percent historically. The field replicate will consist of two field duplicates in 2010 compared to field triplicates, historically.
- The equipment rinsate sample will be collected by rinsing decontaminated sampling equipment with deionized water in a manner similar to actual sample collection. Equipment rinsate samples (ERs) will be taken on a daily basis whenever non-dedicated sampling equipment is used. For example, wells have dedicated pumps or equipment and will not need an equipment rinsate sample taken. Surface water samples will require the collection of ER samples as non-dedicated sampling

equipment may be used. If more than one team collects samples on a given day, ERs will also be taken by each sampling team.

- The source water blank will be a sample of the deionized water used for the equipment rinsate sample. Source water blank samples will be collected once at the beginning of each sampling event, and whenever new source water is used.

- For matrix spike analysis, field teams will collect additional volume and designate on the chain-of-custody forms that the samples are for matrix spike analysis. Matrix spike samples will be collected on a daily basis. Sufficient sample will be collected such that matrix spike/matrix spike duplicate pairs will be analyzed at a rate of 5 percent of field samples.

Refer to the *QAPP Addendum* (MWH, 2009c) for further details regarding groundwater sampling QA/QC procedures. The QA/QC samples as well as a summary of all samples are provided on Tables 4 though 9.

6.0 REFERENCES

MWH, 2008. *Conditional Final - 2007 Hydrogeologic Data Collection Activities and Updated Conceptual Models - Interim Report for Hydrogeologic Investigation.* July.

MWH, 2009a. *2009 Groundwater Monitoring Sampling and Analysis Plan.* Prepared for P4 Production. August.

MWH, 2009b. *2009 and 2010 Surface Water Monitoring Sampling and Analysis Plan.* Prepared for P4 Production. May.

MWH, 2009c. *Quality Assurance Project Plan Addendum Program Quality Assurance Plan.* Prepared for P4 Production. January.

TABLES

TABLE 1

2010 GROUNDWATER MONITORING LOCATIONS, FREQUENCY, AND SCHEDULE

Mine	Station Description	Station ID	Station Type	Well Installation Year	Groundwater System Monitored and Screened Interval (ft bgs)	Spring 2010	Fall 2010
Ballard	Short Creek	MBW006	BW	2008	Alluvial 14-9	x	
	Blackfoot River Road @ Monsanto Haul Road	MBW009	BW	2008	Alluvial 11-6	x	
	Ballard Creek	MBW011	BW	2008	Alluvial 15-10	x	
	Ballard, Western Shallow	MBW026	BW	2008	Alluvial 11-6	**	
	Ballard, Western Deeper	MBW027	BW	2008	Alluvial 16-11	x	
	(b) (6)	MBW028	BW	2008	Alluvial 21-16	x	
	(b) (6)	MBW032	BW	2008	Alluvial 15-10	x	
	Wooley Valley Creek	MBW048	BW	2008	Alluvial 9-4	x	
	East of Ballard Mine, along Wooley Valley Creek	MBW130	BW	2009	Alluvial 25-20	x	
	Northeast of Ballard Mine, near MST093	MBW131	BW	2009	Alluvial 8-3	x	
	Southeast of Ballard Mine, across Blackfoot River Road	MBW135	BW	2009	Alluvial 20-15	x	
	South of West Ballard Pit; south of waste rock dumps	MMW006	MW	2007	Wells Formation 330-310	x	
	Northwest of Ballard Mine into Long Valley Creek alluvial flow field	MMW017	MW	2007	Alluvial 56-36	x	
	East of Ballard Mine in Wooley Valley alluvial flow field	MMW018	MW	2007	Alluvial 33-18	x	
	East side of West Ballard Pit (MMP035); replacement of MMW001	MMW020	MW	2007	Wells Formation 408-388	x	
	West side of West Ballard Pit (MMP035); replacement of MMW002	MMW021	MW	2007	Wells Formation 250-230	x	
	East Ballard mine area in the vicinity of MMW018	MMW029	MW	2008	Dinwoody Formation 60-45	x	x
	Along the southwestern portion of Ballard Mine in the vicinity of MMW016A	MMW030	MW	2008	Wells Formation 155-135	x	
	Along the western perimeter of Ballard Mine in the vicinity and north of MMW017	MMW031	MW	2008	Wells Formation 200-180	x	
	Adjacent to MWD084	MMW032	MW	2009	Alluvial 65-55	x	TBD
	Deeper well nested with MMW029	MMW033	MW	2009	Dinwoody Formation 148 – 128	x	TBD
	West Ballard Mine near MST068	MW-15A	MW	2006	Alluvial 40-30	x	
	Southwest Ballard Mine near MST069	MW-16A	MW	2006	Alluvial 30-20	x	

TABLE 1

2010 GROUNDWATER MONITORING LOCATIONS, FREQUENCY, AND SCHEDULE

Mine	Station Description	Station ID	Station Type	Well Installation Year	Groundwater System Monitored and Screened Interval (ft bgs)	Spring 2010	Fall 2010
	Ballard Mine, Pit #2 Upper Dump Seep	MDS030	DS	-	-	x	x
	Ballard Mine, (b) (6) Spring	MSG004	SG	-	-	x	x
	Ballard Mine, Cattle Spring	MSG005	SG	-	-	x	
	Ballard Mine, Southeast Spring	MSG006	SG	-	-	x	
	Ballard Mine, South of Southeast Spring	MSG007	SG	-	-	x	
	Short Creek below Ballard Mine	MST069	ST	-	-	x	x
	Tributary of North Fork Wooley Valley Creek, below Ballard Mine	MST096	ST	-	-	x	
Henry	North Hnery Mine, along Little Blackfoot River	MBW152	BW	2009	Alluvial 15-10	x	
	Henry Mine, Dump Seep #3 (new for 2008)	MDS034	DS	-	-	x	x
	North of Henry Mine north pit	MMW004	MW	before 2007*	Alluvial/ Dinwoody Formation No screen	**	
	Southeast of Center Henry Pit; near MPW023	MMW010	MW	2007	Alluvial 32-12	x	x
	Northwest of Center Henry Pit; south of Little Blackfoot River	MMW011	MW	2007	Wells Formation 115-95	x	
	Southeast of Henry Mine center pit in Lone Pine Creek alluvial flow field	MMW014	MW	2007	Alluvial 22-7	**	
	North of Henry Mine center pit	MMW019	MW	2007	Alluvial 14-4	**	
	Northeast lobe of Henry Mine waste rock dump MWD086	MMW022	MW	2007	Dinwoody Formation 326-306	x	
	Henry Mine North Pit	MMW023	MW	2007	Wells Formation 357-352	x	
	Near the Little Blackfoot River northwest of MMW019	MMW028	MW	2008	Dinwoody Formation 96-76	x	
Enoch Valley	Rasmussen Creek	MBW085	BW	2008	Alluvial 12.25-7.25	x	
	Rasmussen Road and Agrium Haul Road intersection	MBW087	BW	2008	Alluvial 12-7	x	
	Agrium Haul Road North	MBW099	BW	2008	Alluvial 29-24	x	
	Western Enoch Valley, East of fence	MBW107	BW	2008	Alluvial 40-35	x	
	Western Enoch Valley ,West of fence	MBW112	BW	2008	Alluvial 18-13	***	
	Enoch Valley Mine, West Dump Seep	MDS025	DS	-	-	x	x
	Enoch Valley Mine, South Dump Seep	MDS026	DS	-	-	x	x
	South of EVM South Dump; near edge of dump footprint	MMW007	MW	2007	Alluvial 90-70	x	

TABLE 1

2010 GROUNDWATER MONITORING LOCATIONS, FREQUENCY, AND SCHEDULE

Mine	Station Description	Station ID	Station Type	Well Installation Year	Groundwater System Monitored and Screened Interval (ft bgs)	Spring 2010	Fall 2010
	South of EVM South Dump; south and downgradient of MMW007	MMW008	MW	2007	Alluvial/Dinwoody Formation 197-177	**	
	Central North Dump (MWD091)	MMW009	MW	2007	Wells Formation 554-549	x	
	Northwest of EVM North Dump in Lone Pine Creek alluvial flow field	MMW012	MW	2007	Alluvial 52-28	***	
	Southwest of EVM in Rasmussen Creek alluvial flow field	MMW013	MW	2007	Dinwoody Formation 35-25	x	x
	Along the south end of Enoch Valley Mine, near MMW013	MMW024	MW	2008	Dinwoody Formation 200-180	**	
	Along the south end of Enoch Valley Mine, near MMW007	MMW025	MW	2008	Dinwoody Formation 200-180	x	
	Northeast of MPW006/MMW008	MMW026	MW	2008	Wells Formation 355-335	**	
	Near MMW012	MMW027	MW	2008	Dinwoody Formation 120-100	x	
	Deeper well nested with MMW013	MMW034	MW	2009	Dinwoody Formation 156-136	x	TBD
	Deeper well nested with MMW027	MMW035	MW	2009	Dinwoody Formation 199 – 179	x	TBD
	Well west of MMW027	MMW036	MW	2009	Alluvial 135 – 115	x	TBD
	Rasmussen Creek headwaters near Enoch Valley Mine Shop Pond	MST136	ST	-	-	x	
	West Pond Creek headwaters, below West Pond	MST144	ST	-	-	x	x

Notes:

DS - Dump Seep
BW - Borehole Monitoring Well
SG - Spring
MW - Monitoring Well
ST – Stream
TBD – To Be Determined

* - Exact date of installation is not known
** - Water level to be monitored
*** - Water level to be monitored, if groundwater is present, sampling of this well will be considered following consultation with the A/T.

Will not be sampled in 2010

TABLE 2
2010 GROUNDWATER PROPOSED ANALYTE LIST

Category	Fraction	Analytes (Analytical Method)
2009 monitoring wells (spring 2010 event only)		Expanded Analyte List
	Unfiltered	TDS (EPA 160.1)
	Unfiltered	TSS (EPA 160.2)
	Unfiltered	Al, Ba, Be, Fe, Mo, V (EPA 6010B)
	Unfiltered	Sb, As, Cd, Cr, Co, Cu, Pb, Mn, Ni, Se, Ag, Tl, U, Zn (EPA 6020A)
	Unfiltered	Hg (EPA 7471)
	Unfiltered	Gross alpha, gross beta (EPA 900)
	Filtered	Nitrogen - total nitrate-nitrite (EPA 353.2)
	Filtered	SO_4, Cl (EPA 300.0)
	Filtered	Ca, Fe, Mg, K, Na (EPA 6010B)
	Filtered	Alkalinity (EPA 310.2)
	Filtered	Hardness (SM2340B)
2008 & older monitoring wells and direct push borehole wells (excluding MMW009)		Primary Analyte List
	Unfiltered*	Cd, Se (EPA 6020A)
	Filtered	SO_4 (EPA 300.0)
	Unfiltered	TDS (EPA 160.1)
MMW009	Unfiltered	Cd, Se, Pb (EPA 6020A)
	Filtered	SO_4 (EPA 300.0)
	Unfiltered	TDS (EPA 160.1)
Potential 2010 wells		Regular Analyte List
	Unfiltered	TDS (EPA 160.1)
	Unfiltered	TSS (EPA 160.2)
	Unfiltered	Al, Fe, V (EPA 6010B)
	Unfiltered	Cd, Cr, Mn, Ni, Se, Zn (EPA 6020A)
	Unfiltered	Gross alpha, gross beta (EPA 900)
	Filtered	Nitrogen - total nitrate-nitrite (EPA 353.2)
	Filtered	SO_4, Cl (EPA 300.0)
	Filtered	Ca, Fe, Mg, K, Na (EPA 6010B)
	Filtered	Alkalinity (EPA 310.2)
	Filtered	Hardness (SM2340B)
Seeps, springs, and streams	Unfiltered	TDS (EPA 160.1)
	Unfiltered	Cd, Se (EPA 6020A)
	Unfiltered	V (EPA 6010B)
	Filtered	Cd (EPA 6020A)
	Filtered	Ca, Mg (EPA 6010B)
	Filtered	SO_4, Cl (EPA 300.0)

Notes:
Hardness is calculated on filtered fractions of Ca and Mg
Direct-push monitoring wells may be sampled for dissolved or dissolved and total fractions depending on turbidity (see Section 3 and Table 3).

TABLE 3
GROUNDWATER ANALYTICAL SUMMARY

Parameter	2009 MW's	2008 & Older MWs & BW Wells	Potential 2010 Wells	Seeps , Springs, & Streams	Basis	Method	RL	Reporting Units	Holding Times (days)
alkalinity	x		x		total	310.2	10	mg/L	14
aluminum	x		x		total	6010B	0.1	mg/L	180
antimony	x				total	6020A	0.1	mg/L	180
arsenic	x				total	6020A	0.001	mg/L	180
barium	x				total	6010B	0.01	mg/L	180
beryllium	x				total	6010B	0.002	mg/L	180
cadmium		+		x	dissolved	6020A	0.0005	mg/L	180
cadmium	x	+	x	x	total	6020A	0.0005	mg/L	180
calcium	x		x	x	dissolved	6010B	0.2	mg/L	180
chloride	x		x	x	dissolved	300.0	0.2	mg/L	28
chromium	x		x		total	6020A	0.002	mg/L	180
cobalt	x				total	6020A	0.001	mg/L	180
copper	x				total	6020A	0.002	mg/L	180
gross alpha	x		x		total	900	5	pCi/L	180
gross beta	x		x		total	900	5	pCi/L	180
hardness	x		x		dissolved	2340B-Calculation	5	mg/L	n/a
iron	x		x		dissolved	6010B	0.1	mg/L	180
iron	x		x		total	6010B	0.1	mg/L	180
lead	x				total	6020A	0.001	mg/L	180
manganese	x		x		total	6020A	0.002	mg/L	180
magnesium	x		x	x	dissolved	6010B	0.5	mg/L	180
mercury	x				total	7471	0.002	mg/L	28
molybdenum	x				total	6010B	0.01	mg/L	180
nickel	x		x		total	6020A	0.004	mg/L	180
nitrogen (total nitrate – nitrite)	x		x		total	353.2	0.05	mg/L	28
potassium	x	x	x		dissolved	6010B	1	mg/L	180
selenium	x	+	x	x	total	6020A	0.001	mg/L	180
selenium		+			dissolved	6020A	0.001	mg/L	180
silver	x				total	6020A	0.001	mg/L	180
sodium	x		x		dissolved	6010B	0.5	mg/L	180
sulfate	x	x	x	x	dissolved	300.0	1	mg/L	28
thallium	x				total	6020A	0.0002	mg/L	180
total dissolved solids	x	x	x	x	total	160.1	10	mg/L	7
total suspended solids	x		x		total	160.2	5	mg/L	7

TABLE 3
GROUNDWATER ANALYTICAL SUMMARY

Parameter	2009 MW's	2008 & Older MWs & BW Wells	Potential 2010 Wells	Seeps , Springs, & Streams	Basis	Method	RL	Reporting Units	Holding Times (days)
uranium	x				total	6020A	0.040	mg/L	180
vanadium	x		x	x	total	6010B	0.01	mg/L	180
zinc	x		x		total	6020A	0.025	mg/L	180

Notes:
X – Well sampled for this analyte
+ - Direct-push wells may be sampled also for dissolved selenium and cadmium if they have elevated turbidity (> 5 NTU), if low turbidity, they will be sampled for total and dissolved for there is sufficient water volume, otherwise a total sample will be collected.
Method - Method to be utilized by Microbac
MW - Monitoring Well
BW - Direct-Push Borehole Well
RL - Reporting Limit of Microbac

From Appendix B, *2008 Phase IIb Monitoring Well Installation Technical Memorandum – Final:*

Table B-3
2008 Groundwater Analytes for Existing Wells

Parameter	Method	EDL	Reporting Units	Holding Time (days)
alkalinity, total	SM2320B	2	mg/L	14
aluminum	M200.7 ICP	0.03	mg/L	180
antimony*	M200.8 ICP/MS	0.0004	mg/L	180
Arsenic*	M200.8 ICP/MS	0.0001	mg/L	180
Barium*	M200.7 ICP	0.0001	mg/L	180
beryllium*	M200.7 ICP	0.0001	mg/L	180
cadmium	M200.8 ICP/MS	0.0001	mg/L	180
calcium	M200.7 ICP	0.2	mg/L	180
chloride	M300.0	0.5	mg/L	28
chromium*	M200.8 ICP/MS	0.0001	mg/L	180
cobalt*	M200.7 ICP	0.01	mg/L	180
copper*	M200.7 ICP	0.01	mg/L	180
gross alpha	M900.0	2	pCi/L	180
gross beta	M900.0	4	pCi/L	180
hardness	Calculation	1.5	mg/L	-
iron	M200.7 ICP	0.01	mg/L	180
ferrous iron, dissolved (Field)	HACH	0.01	mg/L	-
ferric iron, dissolved	Calculation	0.01	mg/L	-
lead*	M200.8 ICP/MS	0.0001	mg/L	180
manganese	M200.8 ICP/MS	0.0005	mg/L	180
magnesium	M200.7 ICP	0.2	mg/L	180
mercury*	M245.1	0.0002	mg/L	28
molybdenum*	M200.7 ICP	0.01	mg/L	180
nickel	M200.8 ICP/MS	0.0006	mg/L	180
Nitrogen (total nitrate-nitrite)	M 353.2	0.02	mg/L	28
orthophosphate	M 365.1	0.005	mg/L	28
pH	M150.1	0.1	pH	-
potassium	M200.7 ICP	0.3	mg/L	180
selenium	SM3114 B, AA-Hydride	0.001	mg/L	180
silver*	M200.7 ICP	0.01	mg/L	180
sodium	M200.7 ICP	0.3	mg/L	180
sulfate	M300.0	0.5	mg/L	28
thallium*	M200.8 ICP/MS	0.0001	mg/L	180
total dissolved solids+	M160.1	10	mg/L	7
total suspended solids+	M160.1	10	mg/L	7
uranium*	M200.8 ICP/MS	0.0001	mg/L	180
vanadium	M200.8 ICP/MS	0.0002	mg/L	180
zinc	M200.8 ICP/MS	0.002	mg/L	180

* -- Analytes to be analyzed only in groundwater collected from monitoring wells MMW007, MMW009, MMW010, MMW012, MMW014, MMW017, and MMW018, and surface water at sites not previously sampled for the expanded list of analytes.
+ -- Analyte to be analyzed only in groundwater collected from monitoring well MMW009 and 5% of these monitoring wells: MMW001, MMW004, MMW009, MMW011, MMW013, MMW014, MMW017, MMW019, MMW020, and MMW022.
bicarbonate and carbonate to be analyzed only in groundwater collected from monitoring wells used for geochemical typing.
Methods are for media (non-blank) samples.
Equipment and field blanks will be analyzed for unfiltered results. For regulatory compliance, all media samples will be analyzed for unfiltered metals.
EDL – Estimated Detection Limit; the laboratory analytical limit does not reflect possible sample-specific elevation of the reporting limit due to dilution, contamination or other issues identified during the data validation process.

Table 4
Spring 2010 Sample Tracker for 2009 Monitoring Wells
(Page 1 of 1)

					Laboratory Parameters - Expanded Analyte List												Field Parameters									
Field Sample Identification [a]	Location	Matrix	Filtered (check for yes)	QC Sample Type	Total Sb, As, Cd, Cr, Co, Cu, Pb, Mn, Ni, Se, Ag, Tl, U, Zn (SW6020A)	Total Al, Ba, Be, Fe Mo, V (SW6010B)	TDS (E160.1)	TSS (E160.2)	Hg (SW 7471)	Gross Alpha, Gross Beta (EPA 900)	Nitrate/nitrite as N (EPA 353.2)	Dissolved S04, Cl (EPA 300.0)	Dissolved Ca, Fe, Mg, K, Na (EPA 6010B)	Total Alkalinity (EPA 310.2)	Dissolved Hardness (SM2340B-Calc)		Conductivity (µS/cm)	Specific Conductivity (µS/cm @ 25°C	pH	Dissolved Oxygen (% sat)	Dissolved Oxygen (mg/L)	Oxidation/Reduction Potential (mV)	Turbidity (ftu)	Water Temperature (°C)	Air Temperature (°C)	Discharge (ft^3/sec)
1005GWMMW032-U	MMW032	Water		Primary	X	X	X	X	X	X								X	X		X	X	X	X	X	
1005GWMMW032-F	MMW032	Water	X	Primary							X	X	X	X	X			X	X		X	X	X	X	X	
1005GWMMW033-U	MMW033	Water		Primary	X	X	X	X	X	X								X	X		X	X	X	X	X	
1005GWMMW033-F	MMW033	Water	X	Primary							X	X	X	X	X			X	X		X	X	X	X	X	
1005GWMMW034-1-U	MMW034	Water		Primary	X	X	X	X	X	X								X	X		X	X	X	X	X	
1005GWMMW034-1-F	MMW034	Water	X	Primary							X	X	X	X	X			X	X		X	X	X	X	X	
1005GWMMW034-2-U	MMW034	Water		Duplicate	X	X	X	X	X	X								X	X		X	X	X	X	X	
1005GWMMW034-2-F	MMW034	Water	X	Duplicate							X	X	X	X	X			X	X		X	X	X	X	X	
1005GWMMW035-U	MMW035	Water		Primary	X	X	X	X	X	X								X	X		X	X	X	X	X	
1005GWMMW035-F	MMW035	Water	X	Primary							X	X	X	X	X			X	X		X	X	X	X	X	
1005GWMMW036-U	MMW036	Water		Primary	X	X	X	X	X	X								X	X		X	X	X	X	X	
1005GWMMW036-F	MMW036	Water	X	Primary							X	X	X	X	X			X	X		X	X	X	X	X	
1005B-GW-10-U	na	Water		B	X	X	X	X	X	X																
1005B-GW-10-F	na	Water	X	B							X	X	X	X	X											

B – source water blank sample, to be taken once at the beginning of each sampling event and whenever new source water is used.

ID - identification

na - not applicable

QC - quality control

Primary QC sample indicates that it is the first samples collected.

[a] Sample Identification will also include a date prefix reflecting the year and month the sample was taken. For example, a sample taken in June of 2010 would have a prefix of (1006) followed by the normal sample ID.

Table 5
Fall 2010 Sample Tracker for 2009 Monitoring Wells
(Page 1 of 1)

					Lab Parameters - Primary List				Field Parameters										
Field Sample Identification [a]	Location	Matrix	Filtered (check for yes)	QC Sample Type	Total Cd, Se (SW6020A)	TDS (E 160.1)	S04 (EPA 300.0)		Conductivity (µS/cm)	Specific Conductivity (µS/cm @ 25°C)	pH	Dissolved Oxygen (% sat)	Dissolved Oxygen (mg/L)	Oxidation/Reduction Potential (mV)	Turbidity (ftu)	Water Temperature (°C)	Air Temperature (°C)	Discharge (ft^3/sec)
1009GWMMWTBD-U	TBD	Water		Primary	X	X				X	X		X	X	X	X	X	
1009GWMMWTBD-F	TBD	Water	X	Primary			X			X	X		X	X	X	X	X	
1009GWMMWTBD-U	TBD	Water		Primary	X	X				X	X		X	X	X	X	X	
1009GWMMWTBD-F	TBD	Water	X	Primary			X			X	X		X	X	X	X	X	
1009GWMMWTBD-U	TBD	Water		Primary	X	X				X	X		X	X	X	X	X	
1009GWMMWTBD-F	TBD	Water	X	Primary			X			X	X		X	X	X	X	X	
1009GWMMWTBD-U	TBD	Water		Primary	X	X				X	X		X	X	X	X	X	
1009GWMMWTBD-F	TBD	Water	X	Primary			X			X	X		X	X	X	X	X	
1009GWMMWTBD-U	TBD	Water		Primary	X	X				X	X		X	X	X	X	X	
1009GWMMWTBD-F	TBD	Water	X	Primary			X			X	X		X	X	X	X	X	
1009B-GW-10-U	na	Water		B	X	X												
1009B-GW-10-F	na	Water	X	B			X											

B – source water blank sample, to be taken once at the beginning of each sampling event and whenever new source water is used.

ID - identification

na - not applicable

QC - quality control

Primary QC sample indicates that it is the first samples collected.

TBD - to be determined

[a] Sample Identification will also include a date prefix reflecting the year and month the sample was taken. For example, a sample taken in June of 2010 would have a prefix of (1006) followed by the normal sample ID.

Table 6
Spring 2010 Sample Tracker for 2008 and Older Monitoring Wells and Direct Push Borehole Wells
(Page 1 of 4)

					Lab Parameters - Primary Analyte List					Field Parameters									
Field Sample Identification [a]	Location	Matrix	Filtered (check for yes)	QC Sample Type	Total Cd, Se (SW6020A)	TDS (E 160.1)	S04 (EPA 300.0)	Total Pb (SW6020A)		Conductivity (µS/cm)	Specific Conductivity (µS/cm @ 25°C)	pH	Dissolved Oxygen (% sat)	Dissolved Oxygen (mg/L)	Oxidation/Reduction Potential (mV)	Turbidity (ftu)	Water Temperature (°C)	Air Temperature (°C)	Discharge (ft^3/sec)
10095GWMBW006-U	MBW006	Water		Primary	X	X					X	X		X	X	X	X	X	
10095GWMBW006-F	MBW006	Water	X	Primary	O	O	X				X	X		X	X	X	X	X	
10095GWMBW009-U	MBW009	Water		Primary	X	X					X	X		X	X	X	X	X	
10095GWMBW009-F	MBW009	Water	X	Primary	O	O	X				X	X		X	X	X	X	X	
10095GWMBW011-U	MBW011	Water		Primary	X	X					X	X		X	X	X	X	X	
10095GWMBW011-F	MBW011	Water	X	Primary	O	O	X				X	X		X	X	X	X	X	
10095GWMBW027-U	MBW027	Water		Primary	X	X					X	X		X	X	X	X	X	
10095GWMBW027-F	MBW027	Water	X	Primary	O	O	X				X	X		X	X	X	X	X	
10095GWMBW028-U	MBW028	Water		Primary	X	X					X	X		X	X	X	X	X	
10095GWMBW028-F	MBW028	Water	X	Primary	O	O	X				X	X		X	X	X	X	X	
10095GWMBW032-1-U	MBW032	Water		Primary	X	X					X	X		X	X	X	X	X	
10095GWMBW032-1-F	MBW032	Water	X	Primary	O	O	X				X	X		X	X	X	X	X	
10095GWMBW032-2-U	MBW032	Water		Duplicate	X	X					X	X		X	X	X	X	X	
10095GWMBW032-2-F	MBW032	Water	X	Duplicate	O	O	X				X	X		X	X	X	X	X	
10095GWMBW048-U	MBW048	Water		Primary	X	X					X	X		X	X	X	X	X	
10095GWMBW048-F	MBW048	Water	X	Primary	O	O	X				X	X		X	X	X	X	X	
10095GWMBW085-U	MBW085	Water		Primary	X	X					X	X		X	X	X	X	X	
10095GWMBW085-F	MBW085	Water	X	Primary	O	O	X				X	X		X	X	X	X	X	
10095GWMBW087-1-U	MBW087	Water		Primary	X	X					X	X		X	X	X	X	X	
10095GWMBW087-1-F	MBW087	Water	X	Primary	O	O	X				X	X		X	X	X	X	X	
10095GWMBW099-U	MBW099	Water		Primary	X	X					X	X		X	X	X	X	X	
10095GWMBW099-F	MBW099	Water	X	Primary	O	O	X				X	X		X	X	X	X	X	
10095GWMBW107-U	MBW107	Water		Primary	X	X					X	X		X	X	X	X	X	
10095GWMBW107-F	MBW107	Water	X	Primary	O	O	X				X	X		X	X	X	X	X	

Table 6
Spring 2010 Sample Tracker for 2008 and Older Monitoring Wells and Direct Push Borehole Wells
(Page 2 of 4)

					Lab Parameters - Primary Analyte List					Field Parameters									
Field Sample Identification [a]	Location	Matrix	Filtered (check for yes)	QC Sample Type	Total Cd, Se (SW6020A)	TDS (E 160.1)	S04 (EPA 300.0)	Total Pb (SW6020A)		Conductivity (µS/cm)	Specific Conductivity (µS/cm @ 25°C)	pH	Dissolved Oxygen (% sat)	Dissolved Oxygen (mg/L)	Oxidation/Reduction Potential (mV)	Turbidity (ftu)	Water Temperature (°C)	Air Temperature (°C)	Discharge (ft^3/sec)
1005GWMBW130-U	MBW130	Water		Primary	X	X					X	X		X	X	X	X	X	
1005GWMBW130-F	MBW130	Water	X	Primary	O	O	X				X	X		X	X	X	X	X	
1005GWMBW131-U	MBW131	Water		Primary	X	X					X	X		X	X	X	X	X	
1005GWMBW131-F	MBW131	Water	X	Primary	O	O	X				X	X		X	X	X	X	X	
1005GWMBW135-U	MBW135	Water		Primary	X	X					X	X		X	X	X	X	X	
1005GWMBW135-F	MBW135	Water	X	Primary	O	O	X				X	X		X	X	X	X	X	
1005GWMBW152-U	MBW152	Water		Primary	X	X					X	X		X	X	X	X	X	
1005GWMBW152-F	MBW152	Water	X	Primary	O	O	X				X	X		X	X	X	X	X	
1005GWMMW006-U	MMW006	Water		Primary	X	X					X	X		X	X	X	X	X	
1005GWMMW006-F	MMW006	Water	X	Primary			X				X	X		X	X	X	X	X	
1005GWMMW007-U	MMW007	Water		Primary	X	X					X	X		X	X	X	X	X	
1005GWMMW007-F	MMW007	Water	X	Primary			X				X	X		X	X	X	X	X	
1005GWMMW008-U	MMW008	Water		Primary	X	X					X	X		X	X	X	X	X	
1005GWMMW008-F	MMW008	Water	X	Primary			X				X	X		X	X	X	X	X	
1005GWMMW009-U	MMW009	Water		Primary	X	X		X			X	X		X	X	X	X	X	
1005GWMMW009-F	MMW009	Water	X	Primary			X				X	X		X	X	X	X	X	
1005GWMMW010-U	MMW010	Water		Primary	X	X					X	X		X	X	X	X	X	
1005GWMMW010-F	MMW010	Water	X	Primary			X				X	X		X	X	X	X	X	
1005GWMMW011-U	MMW011	Water		Primary	X	X					X	X		X	X	X	X	X	
1005GWMMW011-F	MMW011	Water	X	Primary			X				X	X		X	X	X	X	X	
1005GWMMW013-U	MMW013	Water		Primary	X	X					X	X		X	X	X	X	X	
1005GWMMW013-F	MMW013	Water	X	Primary			X				X	X		X	X	X	X	X	

Table 6
Spring 2010 Sample Tracker for 2008 and Older Monitoring Wells and Direct Push Borehole Wells
(Page 3 of 4)

					Lab Parameters - Primary Analyte List					Field Parameters									
Field Sample Identification [a]	Location	Matrix	Filtered (check for yes)	QC Sample Type	Total Cd, Se (SW6020A)	TDS (E 160.1)	S04 (EPA 300.0)	Total Pb (SW6020A)		Conductivity (µS/cm)	Specific Conductivity (µS/cm @ 25°C)	pH	Dissolved Oxygen (% sat)	Dissolved Oxygen (mg/L)	Oxidation/Reduction Potential (mV)	Turbidity (ftu)	Water Temperature (°C)	Air Temperature (°C)	Discharge (ft^3/sec)
1005GWMMW017-U	MMW017	Water		Primary	X	X					X	X		X	X	X	X	X	
1005GWMMW017-F	MMW017	Water	X	Primary			X				X	X		X	X	X	X	X	
1005GWMMW018-1-U	MMW018	Water		Primary	X	X					X	X		X	X	X	X	X	
1005GWMMW018-1-F	MMW018	Water	X	Primary			X				X	X		X	X	X	X	X	
1005GWMMW018-2-U	MMW018	Water		Duplicate	X	X					X	X		X	X	X	X	X	
1005GWMMW018-2-F	MMW018	Water	X	Duplicate			X				X	X		X	X	X	X	X	
1005GWMMW020-U	MMW020	Water		Primary	X	X					X	X		X	X	X	X	X	
1005GWMMW020-F	MMW020	Water	X	Primary			X				X	X		X	X	X	X	X	
1005GWMMW021-U	MMW021	Water		Primary	X	X					X	X		X	X	X	X	X	
1005GWMMW021-F	MMW021	Water	X	Primary			X				X	X		X	X	X	X	X	
1005GWMMW022-U	MMW022	Water		Primary	X	X					X	X		X	X	X	X	X	
1005GWMMW022-F	MMW022	Water	X	Primary			X				X	X		X	X	X	X	X	
1005GWMMW023-U	MMW023	Water		Primary	X	X					X	X		X	X	X	X	X	
1005GWMMW023-F	MMW023	Water	X	Primary			X				X	X		X	X	X	X	X	
1005GWMMW025-U	MMW025	Water		Primary	X	X					X	X		X	X	X	X	X	
1005GWMMW025-F	MMW025	Water	X	Primary			X				X	X		X	X	X	X	X	
1005GWMMW027-U	MMW027	Water		Primary	X	X					X	X		X	X	X	X	X	
1005GWMMW027-F	MMW027	Water	X	Primary			X				X	X		X	X	X	X	X	
1005GWMMW028-U	MMW028	Water		Primary	X	X					X	X		X	X	X	X	X	
1005GWMMW028-F	MMW028	Water	X	Primary			X				X	X		X	X	X	X	X	
1005GWMMW029-U	MMW029	Water		Primary	X	X					X	X		X	X	X	X	X	
1005GWMMW029-F	MMW029	Water	X	Primary			X				X	X		X	X	X	X	X	
1005GWMMW030-U	MMW030	Water		Primary	X	X					X	X		X	X	X	X	X	
1005GWMMW030-F	MMW030	Water	X	Primary			X				X	X		X	X	X	X	X	
1005GWMMW031-U	MMW031	Water		Primary	X	X					X	X		X	X	X	X	X	
1005GWMMW031-F	MMW031	Water	X	Primary			X				X	X		X	X	X	X	X	

Table 6
Spring 2010 Sample Tracker for 2008 and Older Monitoring Wells and Direct Push Borehole Wells
(Page 4 of 4)

					Lab Parameters - Primary Analyte List					Field Parameters									
Field Sample Identification [a]	Location	Matrix	Filtered (check for yes)	QC Sample Type	Total Cd, Se (SW6020A)	TDS (E 160.1)	S04 (EPA 300.0)	Total Pb (SW6020A)		Conductivity (µS/cm)	Specific Conductivity (µS/cm @ 25°C)	pH	Dissolved Oxygen (% sat)	Dissolved Oxygen (mg/L)	Oxidation/Reduction Potential (mV)	Turbidity (ftu)	Water Temperature (°C)	Air Temperature (°C)	Discharge (ft^3/sec)
1005GWMW-15A-U	MW-15A	Water		Primary	X	X					X	X		X	X	X	X	X	
1005GWMW-15A-F	MW-15A	Water	X	Primary			X				X	X		X	X	X	X	X	
1005GWMW-16A-U	MW-16A	Water		Primary	X	X					X	X		X	X	X	X	X	
1005GWMW-16A-F	MW-16A	Water	X	Primary			X				X	X		X	X	X	X	X	
1005B-GW-05-U	na	Water		B	X	X													
1005B-GW-05-F	na	Water	X	B			X												

O - Direct-push monitoring wells will be sample for total and dissolved fraction when the turbidity is less than 5 NTU.

If the turbidity is greater than 5 NTU, then the sample will be analyzed for the dissolved fraction only.

B – source water blank sample, to be taken once at the beginning of each sampling event and whenever new source water is used.

ID - identification

na - not applicable

QC - quality control

Primary QC sample indicates that it is the first samples collected.

[a] Sample Identification will also include a date prefix reflecting the year and month the sample was taken. For example, a sample taken in June of 2010 would have a prefix of (1006) followed by the normal sample ID.

Table 7
Fall 2010 Sample Tracker for 2008 and Older Monitoring Wells and Direct Push Borehole Wells
(Page 1 of 1)

					Lab Parameters - Primary Analyte List				Field Parameters									
Field Sample Identification [a]	Location	Matrix	Filtered (check for yes)	QC Sample Type	Total Cd, Se (SW6020A)	TDS (E 160.1)	S04 (EPA 300.0)		Conductivity (µS/cm)	Specific Conductivity (µS/cm @ 25°C)	pH	Dissolved Oxygen (% sat)	Dissolved Oxygen (mg/L)	Oxidation/Reduction Potential (mV)	Turbidity (ftu)	Water Temperature (°C)	Air Temperature (°C)	Discharge (ft^3/sec)
1009GWMMW010-U	MMW010	Water		Primary	X	X				X	X		X	X	X	X	X	
1009GWMMW010-F	MMW010	Water	X	Primary			X			X	X		X	X	X	X	X	
1009GWMMW013-U	MMW013	Water		Primary	X	X				X	X		X	X	X	X	X	
1009GWMMW013-F	MMW013	Water	X	Primary			X			X	X		X	X	X	X	X	
1009GWMMW029-1-U	MMW029	Water		Primary	X	X				X	X		X	X	X	X	X	
1009GWMMW029-1-F	MMW029	Water	X	Primary			X			X	X		X	X	X	X	X	
1009GWMMW029-2-U	MMW029	Water		Duplicate	X	X				X	X		X	X	X	X	X	
1009GWMMW029-2-F	MMW029	Water	X	Duplicate			X			X	X		X	X	X	X	X	

B – source water blank sample, to be taken once at the beginning of each sampling event and whenever new source water is used.

ID - identification

na - not applicable

QC - quality control

Primary QC sample indicates that it is the first samples collected.

[a] Sample Identification will also include a date prefix reflecting the year and month the sample was taken. For example, a sample taken in June of 2010 would have a prefix of (1006) followed by the normal sample ID.

Table 8
Spring 2010 Sample Tracker for Seeps, Springs, and Streams
(Page 1 of 2)

					Laboratory Parameters - Seeps, Springs, and Streams Analyte List							Field Parameters									
Field Sample Identification [a]	Location	Matrix	Filtered (check for yes)	QC Sample Type	Total Se, Cd (SW6020A)	Total V (EPA6010B)	Dissolved Cd (EPA6020A)	Dissolved Cl, S04 (EPA 300.0)	Dissolved Ca, Mg (EPA 6010B)	Total Dissolved Solids (EPA 160.1)		Conductivity (µS/cm)	Specific Conductivity (µS/cm @ 25°C)	pH	Dissolved Oxygen (% sat)	Dissolved Oxygen (mg/L)	Oxidation/Reduction Potential (mV)	Turbidity (ftu)	Water Temperature (°C)	Air Temperature (°C)	Discharge (ft^3/sec)
1005GWMDS025-U	MDS025	Water		Primary	X	X				X		X	X	X	X	X	X	X	X	X	X
1005GWMDS025-F	MDS025	Water	X	Primary			X	X	X			X	X	X	X	X	X	X	X	X	X
1005GWMDS026-U	MDS026	Water		Primary	X	X				X		X	X	X	X	X	X	X	X	X	X
1005GWMDS026-F	MDS026	Water	X	Primary			X	X	X			X	X	X	X	X	X	X	X	X	X
1005GWMDS030-U	MDS030	Water		Primary	X	X				X		X	X	X	X	X	X	X	X	X	X
1005GWMDS030-F	MDS030	Water	X	Primary			X	X	X			X	X	X	X	X	X	X	X	X	X
1005GWMDS034-U	MDS034	Water		Primary	X	X				X		X	X	X	X	X	X	X	X	X	X
1005GWMDS034-F	MDS034	Water	X	Primary			X	X	X			X	X	X	X	X	X	X	X	X	X
1005GWMSG004-1-U	MSG004	Water		Primary	X	X				X		X	X	X	X	X	X	X	X	X	X
1005GWMSG004-1-F	MSG004	Water	X	Primary			X	X	X			X	X	X	X	X	X	X	X	X	X
1005GWMSG004-2-U	MSG004	Water		Duplicate	X	X				X		X	X	X	X	X	X	X	X	X	X
1005GWMSG004-2-F	MSG004	Water	X	Duplicate			X	X	X			X	X	X	X	X	X	X	X	X	X
1005GWMSG005-U	MSG005	Water		Primary	X	X				X		X	X	X	X	X	X	X	X	X	X
1005GWMSG005-F	MSG005	Water	X	Primary			X	X	X			X	X	X	X	X	X	X	X	X	X
1005GWMSG006-U	MSG006	Water		Primary	X	X				X		X	X	X	X	X	X	X	X	X	X
1005GWMSG006-F	MSG006	Water	X	Primary			X	X	X			X	X	X	X	X	X	X	X	X	X
1005GWMSG007-U	MSG007	Water		Primary	X	X				X		X	X	X	X	X	X	X	X	X	X
1005GWMSG007-F	MSG007	Water	X	Primary			X	X	X			X	X	X	X	X	X	X	X	X	X
1005GWMST069-U	MST069	Water		Primary	X	X				X		X	X	X	X	X	X	X	X	X	X
1005GWMST069-F	MST069	Water	X	Primary			X	X	X			X	X	X	X	X	X	X	X	X	X
1005GWMST096-U	MST096	Water		Primary	X	X				X		X	X	X	X	X	X	X	X	X	X
1005GWMST096-F	MST096	Water	X	Primary			X	X	X			X	X	X	X	X	X	X	X	X	X
1005GWMST136-U	MST136	Water		Primary	X	X				X		X	X	X	X	X	X	X	X	X	X
1005GWMST136-F	MST136	Water	X	Primary			X	X	X			X	X	X	X	X	X	X	X	X	X
1005GWMST144-U	MST144	Water		Primary	X	X				X		X	X	X	X	X	X	X	X	X	X
1005GWMST144-F	MST144	Water	X	Primary			X	X	X			X	X	X	X	X	X	X	X	X	X

Table 8
Spring 2010 Sample Tracker for Seeps, Springs, and Streams
(Page 2 of 2)

					Laboratory Parameters - Seeps, Springs, and Streams Analyte List							Field Parameters									
Field Sample Identification [a]	Location	Matrix	Filtered (check for yes)	QC Sample Type	Total Cd, Se (SW6020A)	Total V (EPA6010B)	Dissolved Cd (EPA6020A)	Dissolved Cl, S04 (EPA 300.0)	Dissolved Ca, Mg (EPA 6010B)	Total Dissolved Solids (EPA 160.1)		Conductivity (µS/cm)	Specific Conductivity (µS/cm @ 25°C)	pH	Dissolved Oxygen (% sat)	Dissolved Oxygen (mg/L)	Oxidation/Reduction Potential (mV)	Turbidity (ftu)	Water Temperature (°C)	Air Temperature (°C)	Discharge (ft^3/sec)
1005ER-GW-01-U	na	Water		ER	X	X				X											
1005ER-GW-01-F	na	Water	X	ER			X	X	X												
1005ER-GW-02-U	na	Water		ER	X	X				X											
1005ER-GW-02-F	na	Water	X	ER			X	X	X												
1005ER-GW-03-U	na	Water		ER	X	X				X											
1005ER-GW-03-F	na	Water	X	ER			X	X	X												
1005ER-GW-04-U	na	Water		ER	X	X				X											
1005ER-GW-04-F	na	Water	X	ER			X	X	X												
1005B-GW-01-U	na	Water		B	X	X				X											
1005B-GW-01-F	na	Water	X	B			X	X	X												

ER - equipment rinsate blank sample, to be taken once per field team per day from non-dedicated sampling equipment, total ERs taken may not add up to what is accounted for here

B – source water blank sample, to be taken once at the beginning of each sampling event and whenever new source water is used.

ID - identification

na - not applicable

QC - quality control

Primary QC sample indicates that it is the first samples collected.

[a] Sample Identification will also include a date prefix reflecting the year and month the sample was taken. For example, a sample taken in June of 2010 would have a prefix of (1006) followed by the normal sample ID.

Table 9
Fall 2010 Sample Tracker for Seeps, Springs, and Streams
(Page 1 of 1)

					Laboratory Parameters - Seeps, Springs, and Streams Analyte List							Field Parameters									
Field Sample Identification [a]	Location	Matrix	Filtered (check for yes)	QC Sample Type	Total Se, Cd (SW6020A)	Total V (EPA6010B)	Dissolved Cd (EPA6020A)	Dissolved Cl, S04 (EPA 300.0)	Dissolved Ca, Mg (EPA 6010B)	Total Dissolved Solids (EPA 160.1)		Conductivity (µS/cm)	Specific Conductivity (µS/cm @ 25°C)	pH	Dissolved Oxygen (% sat)	Dissolved Oxygen (mg/L)	Oxidation/Reduction Potential (mV)	Turbidity (ftu)	Water Temperature (°C)	Air Temperature (°C)	Discharge (ft^3/sec)
1009GWMDS025-U	MDS025	Water		Primary	X	X				X		X	X	X	X	X	X	X	X	X	X
1009GWMDS025-F	MDS025	Water	X	Primary			X	X	X			X	X	X	X	X	X	X	X	X	X
1009GWMDS026-U	MDS026	Water		Primary	X	X				X		X	X	X	X	X	X	X	X	X	X
1009GWMDS026-F	MDS026	Water	X	Primary			X	X	X			X	X	X	X	X	X	X	X	X	X
1009GWMDS030-1-U	MDS030	Water		Primary	X	X				X		X	X	X	X	X	X	X	X	X	X
1009GWMDS030-1-F	MDS030	Water	X	Primary			X	X	X			X	X	X	X	X	X	X	X	X	X
1009GWMDS030-2-U	MDS030	Water		Duplicate	X	X				X		X	X	X	X	X	X	X	X	X	X
1009GWMDS030-2-F	MDS030	Water	X	Duplicate			X	X	X			X	X	X	X	X	X	X	X	X	X
1009GWMDS034-U	MDS034	Water		Primary	X	X				X		X	X	X	X	X	X	X	X	X	X
1009GWMDS034-F	MDS034	Water	X	Primary			X	X	X			X	X	X	X	X	X	X	X	X	X
1009GWMSG004-U	MSG004	Water		Primary	X	X				X		X	X	X	X	X	X	X	X	X	X
1009GWMSG004-F	MSG004	Water	X	Primary			X	X	X			X	X	X	X	X	X	X	X	X	X
1009GWMST069-U	MST069	Water		Primary	X	X				X		X	X	X	X	X	X	X	X	X	X
1009GWMST069-F	MST069	Water	X	Primary			X	X	X			X	X	X	X	X	X	X	X	X	X
1009GWMST144-U	MST144	Water		Primary	X	X				X		X	X	X	X	X	X	X	X	X	X
1009GWMST144-F	MST144	Water	X	Primary			X	X	X			X	X	X	X	X	X	X	X	X	X
1009ER-GW-01-U	na	Water		ER	X	X				X											
1009ER-GW-01-F	na	Water	X	ER			X	X	X												
1009B-GW-01-U	na	Water		B	X	X				X											
1009B-GW-01-F	na	Water	X	B			X	X	X												

ER - equipment rinsate blank sample, to be taken once per field team per day from non-dedicated sampling equipment, total ERs taken may not add up to what is accounted for here

B – source water blank sample, to be taken once at the beginning of each sampling event and whenever new source water is used.

ID - identification

na - not applicable

QC - quality control

Primary QC sample indicates that it is the first samples collected.

[a] Sample Identification will also include a date prefix reflecting the year and month the sample was taken. For example, a sample taken in June of 2010 would have a prefix of (1006) followed by the normal sample ID.

TABLE 10
SUMMARY OF ANALYTICAL RESULTS
SPRING AND FALL 2009 GROUNDWATER MONITORING
(Page 1 of 7)

Location Sample Date Sample Type		MBW006 05/10/2009 Primary	MBW009 05/10/2009 Primary	MBW011 05/10/2009 Primary	MBW026 05/11/2009 Primary	MBW027 05/11/2009 Primary	MBW028 05/11/2009 Primary	MBW032 05/12/2009 Primary	MBW048 05/12/2009 Primary	MBW085 05/13/2009 Primary	MBW087 05/09/2009 Primary
Dissolved Metals											
Aluminum	mg/L										
Cadmium	mg/L										
Calcium	mg/L	**178**	**174**	**108**	**78.1**	**92.2**	**218**	**364**	**18.7**	**58.4**	**87.5**
Chromium	mg/L										
Iron	mg/L	0.0250 U	**0.0305 J**	**0.0434 J**	**0.249**	0.0250 U	0.0250 U	0.0250 U	**0.159**	0.0250 U	0.0250 U
Magnesium	mg/L	**32.1**	**33.8**	**29.2**	**20.6**	**23.9**	**52.2**	**88.7**	**5.97**	**9.43**	**14.6**
Manganese	mg/L										
Nickel	mg/L										
Potassium	mg/L	**1.35**	**0.659 J**	**1.09**	**1.77**	**1.81**	**0.649 J**	**1.94**	**0.531 J**	**0.259 J**	**0.325 J**
Selenium	mg/L										
Sodium	mg/L	**14.3 J**	**17.7 J**	**17.0 J**	**45.1**	**31.2**	**16.7**	**11.9**	**5.51**	**5.35**	**5.83 J**
Vanadium	mg/L										
Zinc	mg/L										
Total Metals											
Aluminum	mg/L	0.0500 U	**0.0793 J**	0.0500 U	**14.4**	**0.283**	**0.114**	0.0500 U	**0.181**	0.0500 U	**0.358**
Antimony	mg/L										
Arsenic	mg/L										
Barium	mg/L										
Beryllium	mg/L										
Cadmium	mg/L	0.000125 U	**0.00106**	**0.000170 J**	**0.000893**	**0.000331 J**	**0.000490 J**	**0.000923**	0.000125 U	0.000125 UJ U	0.000125 U
Chromium	mg/L	**0.00130 J**	**0.000863 J**	**0.00141 J**	**0.0149**	**0.00231**	**0.00211**	**0.00303**	**0.000879 J**	**0.000747 J**	**0.00142 J**
Cobalt	mg/L										
Copper, total	mg/L										
Iron	mg/L	**0.0297 J**	**0.0927 J**	**0.0954 J**	**17.5**	**0.402**	**0.167**	**0.0786 J**	**0.278**	**0.276**	**0.338**
Lead	mg/L										
Manganese	mg/L	**0.0158**	**0.495**	**0.096**	**0.0691**	**0.00508**	**0.176**	**0.00883**	**0.278**	**0.00510 J**	**0.157**
Mercury	mg/L										
Molybdenum	mg/L										
Nickel	mg/L	**0.00606**	**0.0165**	**0.00629**	**0.0200**	**0.00595**	**0.0177**	**0.0119**	**0.00365 J**	**0.00265 J**	**0.00377 J**
Selenium	mg/L	**0.3**	**0.0117**	**0.569**	**0.221**	**0.21**	**0.894**	**0.605**	0.000500 U	**0.00131**	**0.000798 J**
Silver	mg/L										
Thallium	mg/L										
Uranium, total	mg/L										
Vanadium	mg/L	0.00500 U	0.00500 U	0.00500 U	**0.0303**	0.00500 U	0.00500 U	0.00500 U	0.00500 U	0.00500 U	0.00500 U
Zinc	mg/L	**0.00781 J**	**0.00645 J**	**0.170**	**0.0625**	**0.00609 J+/B**	**0.00633 J+/B**	**0.0128 J+/B**	0.00500 U	**0.00695 J+/B**	**0.0244 J**
General Chemistry											
Chloride	mg/L	**4.62**	**4.90**	**12.5**	**4.31**	**4.51**	**10.5**	**5.40**	**4.19**	**5.48**	**16.2**
Hardness as CaCO3	mg/L	**577**	**574**	**389**	**280**	**329**	**760**	**1280**	**71.2**	**185**	**279**
Nitrate/Nitrite as N	mg/L	**0.977**	0.0250 U	**6.07 J-**	**2.08 J-**	**0.307 J+**	**1.96**	**0.516 J+**	**0.0870 J+**	**0.133**	**0.0350 J**
Residue, Filterable (TDS) @180	mg/L	**808**	**800**	**506**	**554**	**508**	**1090**	**1860**	**116**	**228**	**342**
Sulfate	mg/L	**375**	**334**	**163**	**157**	**182**	**474**	**867**	**6.68**	**33.4**	**27.4**
Suspended Solids	mg/L	2.50 U	2.50 U	2.50 U	**127**	**8.50**	**5.00 J**	2.50 U	**3.00 J**	2.50 U	2.50 U
Total Alkalinity	mg/L	**222 J+**	**258 J+**	**207 J+**	**217**	**216**	**251**	**333**	**65.3 J-**	**173**	**259 J+**
Radiological											
Gross Alpha	PCI/L	2.91 U	3.53 U	1.66 U	**8.12**	**5.55**	2.68 U	**12.4**	3.24 U	3.51 U	1.77 U
Gross Beta	PCI/L	4.82 U	4.48 U	3.13 U	4.69 U	3.61 U	2.82 U	**6.10**	4.24 U	3.08 U	2.58 U

TABLE 10
SUMMARY OF ANALYTICAL RESULTS
SPRING AND FALL 2009 GROUNDWATER MONITORING

Location Sample Date Sample Type		MBW099 05/12/2009 Primary	MBW107 06/04/2009 Primary	MBW130 05/15/2009 Primary	MBW131 05/15/2009 Primary	MBW135 05/15/2009 Primary	MBW152 05/16/2009 Primary	MMW004 06/01/2009 Primary	MMW006 06/03/2009 Primary	MMW007 06/01/2009 Primary	MMW008 06/01/2009 Primary
Dissolved Metals											
Aluminum	mg/L	0.0500 U	0.0500 U								
Cadmium	mg/L	0.000125 U	0.000125 U								
Calcium	mg/L	**27.8**	**32.0**								
Chromium	mg/L	**0.00117 J**	**0.00209**								
Iron	mg/L	**0.0693 J**	0.0250 U								
Magnesium	mg/L	**6.75**	**9.06**								
Manganese	mg/L	**0.0385**	**0.00517**								
Nickel	mg/L	**0.00212 J**	**0.00205 J**								
Potassium	mg/L	**0.579 J**	**2.25**								
Selenium	mg/L	0.000500 U	**0.00356**	**0.00223**	0.000500 U	0.000759 UJ U	**0.00536 J**				
Sodium	mg/L	**8.92**	**14.8**								
Vanadium	mg/L	0.00500 U	0.00500 U								
Zinc	mg/L	**0.217**	0.00500 U								
Total Metals											
Aluminum	mg/L										
Antimony	mg/L										
Arsenic	mg/L										
Barium	mg/L										
Beryllium	mg/L										
Cadmium	mg/L										
Chromium	mg/L										
Cobalt	mg/L										
Copper, total	mg/L										
Iron	mg/L										
Lead	mg/L										
Manganese	mg/L										
Mercury	mg/L										
Molybdenum	mg/L										
Nickel	mg/L										
Selenium	mg/L							**0.00273**	**0.0699**	**0.00119**	**0.000606 J**
Silver	mg/L										
Thallium	mg/L										
Uranium, total	mg/L										
Vanadium	mg/L										
Zinc	mg/L										
General Chemistry											
Chloride	mg/L	**9.18**	**3.49**								
Hardness as CaCO3	mg/L	**97.2**	**117**								
Nitrate/Nitrite as N	mg/L	**0.384 J+**	**1.16**								
Residue, Filterable (TDS) @180	mg/L	**128 J-**	**292 J-**					**548**	**402**	**196**	**176**
Sulfate	mg/L	**19.4**	**21.8**					**112**	**58.1**	**35.1**	**16.7**
Suspended Solids	mg/L	2.50 U									
Total Alkalinity	mg/L	**69.3 J-**	**133**								
Radiological											
Gross Alpha	PCI/L	**3.41**	1.97 U								
Gross Beta	PCI/L	**3.02**	3.00 U								

TABLE 10
SUMMARY OF ANALYTICAL RESULTS
SPRING AND FALL 2009 GROUNDWATER MONITORING

Location			MMW009	MMW010	MMW010	MMW011	MMW013	MMW013	MMW013	MMW013	MMW013
Sample Date			06/04/2009	06/04/2009	09/23/2009	06/02/2009	06/03/2009	06/03/2009	06/03/2009	06/03/2009	09/21/2009
Sample Type			Primary	Primary	Primary	Primary	Averaged	Triplicate	Triplicate	Triplicate	Primary
Dissolved Metals											
	Aluminum	mg/L									
	Cadmium	mg/L									
	Calcium	mg/L	**76.8**								
	Chromium	mg/L									
	Iron	mg/L	**0.388**								
	Magnesium	mg/L	**28.2**								
	Manganese	mg/L									
	Nickel	mg/L									
	Potassium	mg/L	**0.570 J**								
	Selenium	mg/L									
	Sodium	mg/L	**5.97**								
	Vanadium	mg/L									
	Zinc	mg/L									
Total Metals											
	Aluminum	mg/L	**0.863**								
	Antimony	mg/L	0.000569 U								
	Arsenic	mg/L	**0.00153**								
	Barium	mg/L	**0.0563**								
	Beryllium	mg/L	0.000500 U								
	Cadmium	mg/L	**0.000571**								
	Chromium	mg/L	**0.00328**								
	Cobalt	mg/L	**0.000459 J**								
	Copper, total	mg/L	**0.00207**								
	Iron	mg/L	**1.1**								
	Lead	mg/L	**0.00218**								
	Manganese	mg/L	**0.112**								
	Mercury	mg/L	0.000100 U								
	Molybdenum	mg/L	**0.0222 J**								
	Nickel	mg/L	**0.0359**								
	Selenium	mg/L	0.000500 U	**0.0764**	**0.0191**	**0.00206**	**0.106**	**0.107**	**0.104**	**0.107**	**0.124**
	Silver	mg/L	0.000250 U								
	Thallium	mg/L	0.0000500 U								
	Uranium, total	mg/L	0.000790 U								
	Vanadium	mg/L	0.00500 U								
	Zinc	mg/L	**0.0430**								
General Chemistry											
	Chloride	mg/L	**4.72**								
	Hardness as CaCO3	mg/L	**308**								
	Nitrate/Nitrite as N	mg/L	**0.0860**								
	Residue, Filterable (TDS) @180	mg/L	**412**	**1770**	**1420**	**450**	**564**	**552**	**582**	**558**	**562**
	Sulfate	mg/L	**55.3**	**688**	**740**	**96.8**	**219**	**219**	**220**	**218**	**258**
	Suspended Solids	mg/L	**34.5**								
	Total Alkalinity	mg/L	**282**								
Radiological											
	Gross Alpha	PCI/L	2.33 U								
	Gross Beta	PCI/L	2.82 U								

TABLE 10
SUMMARY OF ANALYTICAL RESULTS
SPRING AND FALL 2009 GROUNDWATER MONITORING

Location Sample Date Sample Type		MMW014 06/03/2009 Primary	MMW017 06/03/2009 Primary	MMW018 06/02/2009 Primary	MMW019 06/02/2009 Primary	MMW020 06/05/2009 Primary	MMW020 09/23/2009 Primary	MMW021 06/02/2009 Primary	MMW022 06/02/2009 Primary	MMW023 06/01/2009 Primary	MMW024 05/19/2009 Primary
Dissolved Metals											
Aluminum	mg/L										
Cadmium	mg/L										
Calcium	mg/L										**148**
Chromium	mg/L										
Iron	mg/L										0.0250 U
Magnesium	mg/L										**9.79**
Manganese	mg/L										
Nickel	mg/L										
Potassium	mg/L										**0.517 J**
Selenium	mg/L										
Sodium	mg/L										**5.05**
Vanadium	mg/L										
Zinc	mg/L										
Total Metals											
Aluminum	mg/L										0.0500 U
Antimony	mg/L										0.000250 U
Arsenic	mg/L										**0.000256 J**
Barium	mg/L										**0.0256**
Beryllium	mg/L										0.000500 U
Cadmium	mg/L										0.000125 U
Chromium	mg/L										**0.000657 J**
Cobalt	mg/L										0.000250 U
Copper, total	mg/L										**0.000971 J+/B**
Iron	mg/L										0.0250 U
Lead	mg/L										0.000250 U
Manganese	mg/L										**0.000688 J**
Mercury	mg/L										0.000100 U
Molybdenum	mg/L										0.00500 U
Nickel	mg/L										**0.00506**
Selenium	mg/L	**0.00173**	**0.0937**	**0.0276**	**0.00541**	**0.221**	**0.193**	**0.0488**	**0.0206**	**0.017**	**0.0243**
Silver	mg/L										0.000250 U
Thallium	mg/L										0.0000500 U
Uranium, total	mg/L										**0.000540 J**
Vanadium	mg/L										0.00500 U
Zinc	mg/L										0.00500 U
General Chemistry											
Chloride	mg/L										**3.91**
Hardness as CaCO3	mg/L										**411**
Nitrate/Nitrite as N	mg/L										**0.248**
Residue, Filterable (TDS) @180	mg/L	**350**	**1060**	**268**	**308**	**624**	**496**	**408**	**706**	**818**	**618**
Sulfate	mg/L	**28.6**	**447**	**42.9**	**55.9**	**183**	**197**	**46.1**	**246**	**227**	**246**
Suspended Solids	mg/L										2.50 U
Total Alkalinity	mg/L										**169**
Radiological											
Gross Alpha	PCI/L										2.92 U
Gross Beta	PCI/L										2.49 U

TABLE 10
SUMMARY OF ANALYTICAL RESULTS
SPRING AND FALL 2009 GROUNDWATER MONITORING
(Page 5 of 7)

Location			MMW025	MMW026	MMW027	MMW028	MMW029	MMW029	MMW030	MMW031	MMW032	MMW033
Sample Date			05/19/2009	05/29/2009	05/28/2009	05/14/2009	05/14/2009	09/21/2009	05/19/2009	05/13/2009	09/25/2009	09/25/2009
Sample Type			Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
Dissolved Metals												
	Aluminum	mg/L										
	Cadmium	mg/L										
	Calcium	mg/L	**21.9**	**36.2**	**135**	**54.7**	**222**	**226**	**29.6**	**33.2**	**51.9**	**44.4**
	Chromium	mg/L										
	Iron	mg/L	0.0250 U	**0.0513 J**	0.0250 U	0.0250 U	0.0250 U	0.0250 U	0.0250 U	0.0250 U	**0.0301 J**	0.0250 U
	Magnesium	mg/L	**8.26**	**16.2**	**39.0**	**18.4**	**71.3**	**70.8**	**19.8**	**6.87**	**14.1**	**25.7**
	Manganese	mg/L										
	Nickel	mg/L										
	Potassium	mg/L	**1.03**	**1.41**	**1.54**	**1.89**	**1.10**	**1.01**	**1.65**	**1.14**	**0.925 J**	**0.895 J**
	Selenium	mg/L										
	Sodium	mg/L	**25.5**	**28.7**	**6.85**	**26.3**	**10.9**	**9.95**	**21.6**	**7.15**	**22.8**	**22.0**
	Vanadium	mg/L										
	Zinc	mg/L										
Total Metals												
	Aluminum	mg/L	**0.216**	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	**0.426**	0.0500 U	**0.718**	**1.74**
	Antimony	mg/L	0.000250 U	0.000250 U	0.000250 U	0.000250 U	0.000250 U	0.00100 U	**0.00269**	0.000250 U		
	Arsenic	mg/L	**0.000989 J**	**0.000266 J**	**0.00393**	0.000250 U	0.00500 U	0.00125 U	**0.0267**	**0.000456 J**		
	Barium	mg/L	**0.0102**	**0.0216**	**0.0395**	**0.0436**	**0.0257**	**0.0249**	**0.0964**	**0.0355**		
	Beryllium	mg/L	0.000500 U	0.000500 U	0.000500 U	0.000500 U	0.000500 U	0.000500 U	0.000500 U	0.000500 U		
	Cadmium	mg/L	0.000125 U	0.000125 U	0.000125 U	0.000125 U	0.000125 U	0.000125 U	0.000125 U	0.000125 U	**0.000433 J**	0.000125 U
	Chromium	mg/L	**0.00117 J**	**0.00154 J**	**0.00281**	**0.00114 J**	**0.00215**	**0.00312**	**0.00203**	**0.00290**	**0.0103**	**0.00524**
	Cobalt	mg/L	0.000250 U	**0.000281 J**	0.000250 U	0.000250 U	**0.000273 J**	**0.000342 J**	**0.000436 J**	0.000250 U		
	Copper, total	mg/L	**0.000716 J+/B**	0.000500 U	**0.000852 J**	**0.0231**	**0.00175 J+/B**	**0.00195 J**	**0.00169 J+/B**	0.000500 U		
	Iron	mg/L	**0.155**	**0.0382 J**	0.0250 U	0.0250 U	0.0250 U	**0.0396 J+/B**	**0.353**	0.0250 U	**0.396**	**1.16**
	Lead	mg/L	0.000250 U	0.000250 U	0.000250 U	0.000250 U	0.000250 U	0.000250 U	**0.00432**	0.000250 U		
	Manganese	mg/L	**0.0209**	**0.0440**	**0.00115 J**	**0.000563 J**	**0.00223**	**0.00594**	**0.0923**	0.000500 U	**0.0491**	**0.344**
	Mercury	mg/L	0.000100 U	0.000100 U	0.000100 U	0.000100 U	0.000100 U	0.000100 U	0.000100 U	0.000100 U		
	Molybdenum	mg/L	0.00500 U	0.00500 U	0.00500 U	0.00500 U	0.00500 U	0.00500 U	0.00500 U	0.00500 U		
	Nickel	mg/L	**0.00115 J**	**0.00168 J**	**0.00538**	**0.00221 J**	**0.00727**	**0.00862**	**0.00254 J**	**0.00102 J**	**0.00407**	**0.00337 J**
	Selenium	mg/L	**0.00168**	**0.00107 J**	**0.329 J**	**0.00551**	**0.685**	**0.865**	**0.00116**	**0.000683 J**	**0.00267**	**0.00577**
	Silver	mg/L	0.000250 U	0.000250 U	0.000250 U	0.000250 U	0.000250 U	0.000250 U	0.000250 U	0.000250 U		
	Thallium	mg/L	0.0000500 U	0.0000500 U	0.0000500 U	0.0000500 U	0.0000500 U	0.0000500 U	**0.0000538 J**	0.0000500 U		
	Uranium, total	mg/L	**0.000889 J**	**0.00116**	**0.00155**	**0.00112**	**0.00344**	**0.00321**	**0.00171**	**0.000292 J**		
	Vanadium	mg/L	0.00500 U	0.00500 U	0.00500 U	0.00500 U	0.00500 U	**0.0165**	0.00500 U	0.00500 U	**0.0128**	**0.0130**
	Zinc	mg/L	0.00502 UJ/B U	**0.00831 J**	0.00500 U	**1.56**	**0.00596 J+/B**	**0.00503 J**	0.0133 UJ/B U	0.00500 U	**0.0541**	**0.0425**
General Chemistry												
	Chloride	mg/L	**4.09**	**4.89**	**13.0**	**34.2**	**7.64**	**6.88**	**13.2**	**7.29**	**4.01**	**5.22**
	Hardness as CaCO3	mg/L	**88.6**	**157**	**497**	**212**	**849**	**857**	**155**	**111**	**188**	**217**
	Nitrate/Nitrite as N	mg/L	**0.342**	0.0250 U	**1.37**	**0.762**	**0.264**	**0.214 J-**	**0.221**	**0.371**	**0.479**	**0.238**
	Residue, Filterable (TDS) @180	mg/L	**204**	**414**	**2010**	**402**	**1170**	**1200**	**282**	**156**	**248**	**266**
	Sulfate	mg/L	**13.9**	**19.7**	**227**	**70.7**	**556**	**582**	**16.4**	**6.10**	**9.96**	**30.9**
	Suspended Solids	mg/L	**4.50 J**	2.50 U	2.50 U	2.50 U	**4.00 J**	**6.00**	**19.5**	2.50 U	**14.5**	**41.5**
	Total Alkalinity	mg/L	**118**	**198**	**242**	**173**	**266**	**279**	**170**	**125**	**231**	**224**
Radiological												
	Gross Alpha	PCI/L	2.46 U	**4.22**	3.16 U	5.16 U	3.07 U	4.20 U	**5.08**	3.46 U	**7.95**	7.00 U
	Gross Beta	PCI/L	2.29 U	3.20 U	3.81 U	3.12 U	**4.65**	2.38 U	3.84 U	**3.53**	3.98 U	**4.83**

TABLE 10
SUMMARY OF ANALYTICAL RESULTS
SPRING AND FALL 2009 GROUNDWATER MONITORING

Location			MMW034	MMW035	MMW035	MMW035	MMW035	MMW036	MW15A	MW16A
Sample Date			09/22/2009	09/22/2009	09/22/2009	09/22/2009	09/22/2009	09/22/2009	06/05/2009	06/04/2009
Sample Type			Primary	Averaged	Triplicate	Triplicate	Triplicate	Primary	Primary	Primary
Dissolved Metals										
	Aluminum	mg/L								
	Cadmium	mg/L								
	Calcium	mg/L	**130**	**225**	**224**	**227**	**225**	**51.0**	**290**	**292**
	Chromium	mg/L								
	Iron	mg/L	**0.0258 J**	0.0250 U	0.0250 U	0.0250 U	0.0250 U	0.0250 U	0.0250 U	**0.573**
	Magnesium	mg/L	**6.84**	**69.7**	**68.0**	**69.0**	**72.2**	**16.4**	**63.7**	**56.2**
	Manganese	mg/L								
	Nickel	mg/L								
	Potassium	mg/L	**0.774 J**	**1.54**	**1.47**	**1.54**	**1.60**	**0.815 J**	**1.55**	**1.19**
	Selenium	mg/L								
	Sodium	mg/L	**5.05**	**9.75**	**9.44**	**9.70**	**10.1**	**15.9**	**26.7**	**22.3**
	Vanadium	mg/L								
	Zinc	mg/L								
Total Metals										
	Aluminum	mg/L	**0.153**	0.0500 U	0.0500 U	0.0500 U	0.0500 U	**0.426**	**0.262**	0.0500 U
	Antimony	mg/L							0.000527 U	0.000250 U
	Arsenic	mg/L							0.0125 U	**0.00112**
	Barium	mg/L							**0.0349**	**0.0397**
	Beryllium	mg/L							0.000500 U	0.000500 U
	Cadmium	mg/L	0.000125 U	0.000125 U	0.000125 U	0.000125 U	0.000125 U	0.000125 U	**0.000285 J**	0.000125 U
	Chromium	mg/L	**0.00319**	**0.00405**	**0.00314**	**0.00463**	**0.00438**	**0.00357**	**0.00523**	0.000500 U
	Cobalt	mg/L							**0.000954 J**	**0.000361 J**
	Copper, total	mg/L							**0.00341**	**0.00159 J**
	Iron	mg/L	**0.119**	**0.0291 J**	**0.0321 J**	**0.0262 J**	**0.0289 J**	**0.198**	**0.268**	**0.562**
	Lead	mg/L							**0.000950 J**	0.000250 U
	Manganese	mg/L	**0.00968**	**0.00797**	**0.00765**	**0.00842**	**0.00784**	**0.0124**	**0.0336**	**1.81**
	Mercury	mg/L							0.000100 U	0.000100 U
	Molybdenum	mg/L							0.00500 U	0.00500 U
	Nickel	mg/L	**0.00516**	**0.00827**	**0.00717**	**0.00896**	**0.00868**	**0.00226 J**	**0.0127**	**0.0101**
	Selenium	mg/L	**0.0762**	**0.772**	**0.772**	**0.762**	**0.781**	**0.00593**	**1.67**	**0.018**
	Silver	mg/L							0.000250 U	0.000250 U
	Thallium	mg/L							0.0000500 U	0.0000500 U
	Uranium, total	mg/L							**0.00504**	**0.00492**
	Vanadium	mg/L	**0.00987 J**	**0.0256**	**0.025**	**0.0258**	**0.0261**	**0.0109**	0.00500 U	0.00500 U
	Zinc	mg/L	**0.00734 J**	**0.00517 J+/B**	0.00500 U	**0.00517 J+/B**	0.00500 U	0.00500 U	**0.00856 J**	**0.00538 J**
General Chemistry										
	Chloride	mg/L	**8.91**	**17.5**	**17.5**	**17.4**	**17.6**	**7.42**	**6.71**	**12.8**
	Hardness as CaCO3	mg/L	**353**	**850**	**840**	**852**	**859**	**195**	**986**	**960**
	Nitrate/Nitrite as N	mg/L	**0.560**	**1.61**	**1.47**	**1.63**	**1.74**	**1.17**	**2.11**	**0.0280 J**
	Residue, Filterable (TDS) @180	mg/L	**536**	**1140**	**1090**	**1220**	**1100**	**306**	**1580**	**1700**
	Sulfate	mg/L	**209**	**447**	**446**	**447**	**447**	**25.4**	**650**	**748**
	Suspended Solids	mg/L	**3.00 J**	2.50 U	2.50 U	2.50 U	2.50 U	**7.50**	**78.0**	2.50 U
	Total Alkalinity	mg/L	**124**	**409**	**409**	**414**	**405**	**187**	**380**	**228**
Radiological										
	Gross Alpha	PCI/L	3.50 U	**3**	1.96 U	2.80 U	**3.00**	**1.76**	**5.42**	5.21 U
	Gross Beta	PCI/L	**6.63**	**3.12**	2.63 U	**3.12**	2.38 U	2.37 U	4.76 U	4.98 U

TABLE 10
SUMMARY OF ANALYTICAL RESULTS
SPRING AND FALL 2009 GROUNDWATER MONITORING
(Page 7 of 7)

Notes:
BW - direct-push alluvial aquifer well
MW - monitoring well

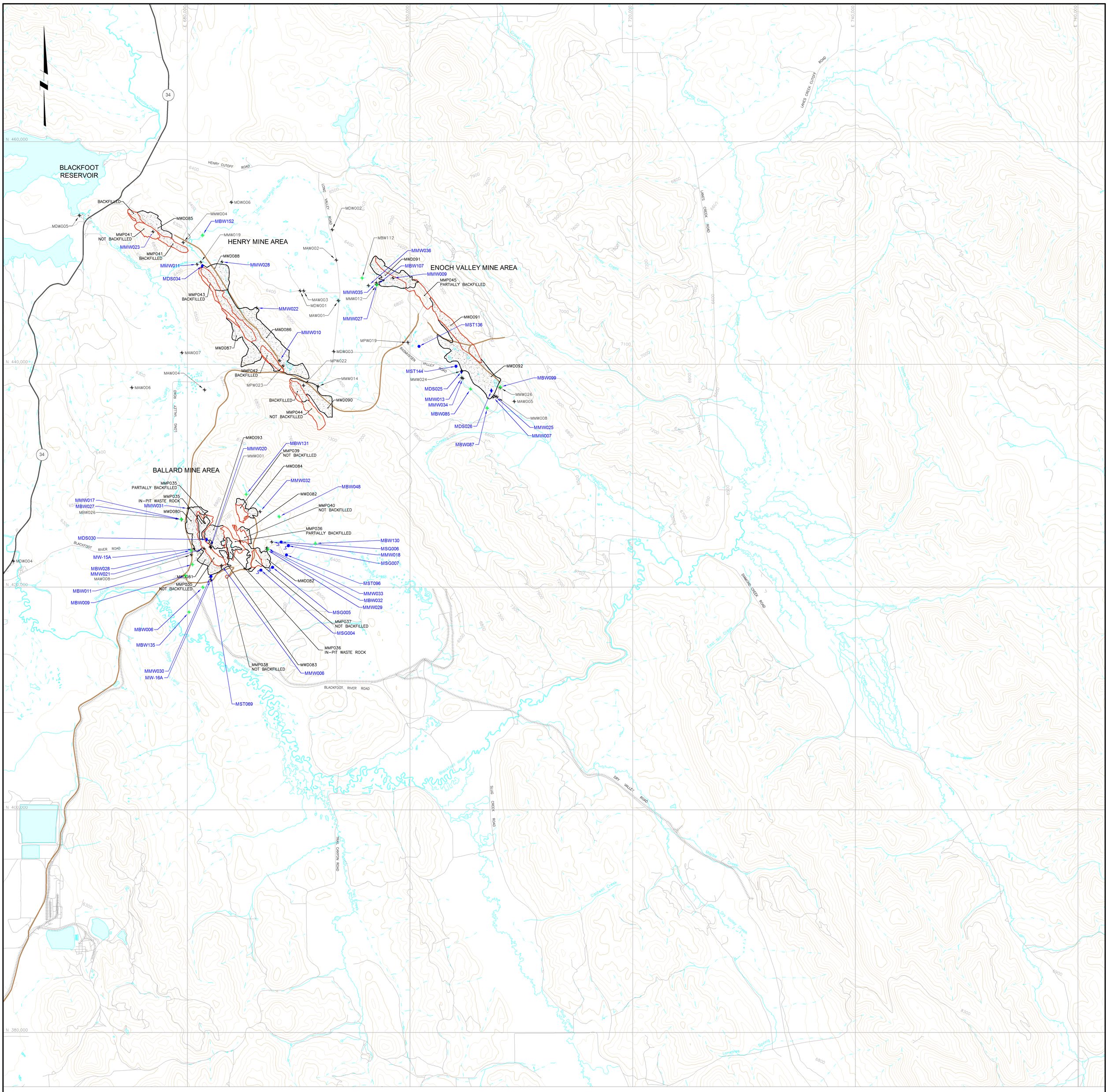
Flag Definition:

U	The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.
J	The result is an estimated quantity. The associated numerical value is the approximated concentration of the analyte in the sample.
J+	The result is an estimated quantity, but the result may be biased high.
J-	The result is an estimated quantity, but the result may be biased low.
J+/B	Result is estimated and biased high; associated field blank contained target analyte.
UJ	The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

Triplicate Results:

The average value for triplicate samples is calculated as follows: (a) the mean of three detected values, (b) the mean of two detected values if result of one triplicate is not detected, (c) the detected value if results of two triplicates are not detected, or (d) less than the highest method detection limit if all triplicate results are not detected.

DRAWINGS



SCALE
3000' 0 3000' 6000'
CONTOUR INTERVAL = 100 FEET

LEGEND:

- POST-MINE CONTOUR AND ELEVATION, FEET (APPROXIMATE)
- RIVER
- POND OR LAKE
- NATURAL DRAINAGE – PERENNIAL
- NATURAL DRAINAGE – INTERMITTENT
- HIGHWAY
- ROAD
- MONSANTO HAUL ROAD (ACTIVE & INACTIVE)
- RAILROAD
- MINE PIT LOCATION (APPROXIMATE WHERE COVERED BY BACKFILL)
- WASTE ROCK DUMP LOCATION (APPROXIMATE)
- WASTE ROCK DUMP LOCATION OR PIT BACKFILL (APPROXIMATE)

STATION TYPE:

- MMW = MONITORING WELL
- MAW = AGRICULTURAL WELL
- MDW = DOMESTIC WELL
- MPW = PRODUCTION WELL
- MBW = DIRECT PUSH WELL
- MMW = MONITORING WELL (PROPOSED 2010)
- MBW = DIRECT PUSH WELL (PROPOSED 2010)
- MDS = DUMP SEEP SAMPLE LOCATION (PROPOSED 2010)
- MST = STREAM SAMPLE LOCATION (PROPOSED 2010)
- MSG = SPRING SAMPLE LOCATION (PROPOSED 2010)

KEY:

MMP = MINE PIT
MWD = WASTE ROCK DUMP

WORKING DRAFT INFORMATIONAL ONLY 5/12/10

ISSUE REV	DESCRIPTION	TECH	ENG	DATE
A	DRAFT	CHF	LWM	04/05/10

DISCLAIMER:
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DRAWING REFERENCE(S):
1. POST-MINE TOPOGRAPHY GENERATED FROM:
- USGS DIGITAL ELEVATION MODELS (DEM)-24K.
- SURVEY DATA FOR BALLARD MINE PROVIDED BY OLYMPUS AERIAL SURVEYS, INC. DATED: JUNE 2005.
- SURVEY DATA FOR HENRY MINE AREA PROVIDED BY OLYMPUS AERIAL SURVEYS, INC. DATED: NOVEMBER 2008.
- SURVEY DATA FOR ENOCH VALLEY MINE AREA PROVIDED BY P4 PRODUCTION DATED: DECEMBER 2007.
- US CENSUS BUREAU 2007 TIGER LINE DATA

PROJECTION: STATE PLANE COORDINATE SYSTEM
ZONE: IDAHO EAST
HORIZONTAL DATUM: NAD27
VERTICAL DATUM: NGVD29
UNITS: U.S. FEET

DESIGNED BY	L WOLF-MARTIN	04/05/10
DRAWN BY	C FOWLER	04/05/10
CHECKED BY	E MARKS	04/05/10
APPROVED BY	L WOLF-MARTIN	04/05/10
PROJECT MANAGER	C FOULK	04/05/10
CLIENT APPROVAL	B KOCH	04/05/10
CLIENT REFERENCE NO.		

P4 Production, LLC

PROJECT LOCATION: BALLARD, HENRY AND ENOCH VALLEY MINES
PROJECT: RI/FS WORK PLAN
TITLE: PROPOSED 2010 GROUNDWATER SAMPLE LOCATIONS

MWH

DRAWING 1 | REVISION A
FILE NAME 1007903D002

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APPENDIX A

Response to A/T Comments on *Draft 2010 Groundwater Monitoring Memorandum, Revision 0,* prepared for P4 Production by MWH, April 2010.

General Comments

The referenced document describes the relevant components for the 2010 groundwater monitoring program at the P4 Production, L.L.C. (P4) mines near Soda Springs, Idaho. The referenced document, however, is not a "stand alone" work planning document. Instead, it is an abbreviated work plan that references applicable components, methods, and procedures included in P4's *2009 Groundwater Monitoring Sampling and Analysis Plan* (*2009 Groundwater SAP;* MWH, 2009a), field sampling plan (FSP), quality assurance project plan (QAPP), and health and safety plan (HSP).

The A/T believes that abbreviated work plans with references other planning documents can be confusing and may result in sampling error and loss of valuable data. For this reason, the A/T generally prefers "stand alone" work planning documents. However, given the relatively narrow scope of the subject field effort (2010 groundwater monitoring), the A/T agrees that an abbreviated work plan is acceptable in this case. The A/T wishes to emphasize, however, that abbreviated work plans may not be acceptable in all cases and the approach should be discussed and agreed upon in advance.

Specific Comments

Page 2, Section 2.1. Please provide justification for not sampling monitoring wells (e.g., MMWOO4, -014, -019, -008, -012, -024, 026) identified in Table 1.

Response: *In general continued sampling of a monitoring well was not recommended if it was redundant (in the same flow path as another well), has been consistently dry, had a sufficiently long sampling record in location that was not impacted by the Sites, or would not be expected to vary during the period of the RI. The justification has been added to the memorandum text and is as follows:*

MMW004: Monitoring well MMW004 is an old open borehole and steel cased well in the northern portion of the Henry Mine. It has been monitored since October 2004 during six sampling events. The selenium concentration has consistently been measured as being between 0.002 and 0.00273 mg/L, with one event having selenium not detected at 0.001 mg/L. Sulfate has also exhibited a narrow range of results over the six year period being between 112 and 137 mg/L. Concentrations over approximately 200 approximately mg/L sulfate are typical but not conclusive of groundwater impacted by waste rock dump seepage. The data from this monitoring well are adequate for the RI/FS, and it is reasonable to assume the concentration will not be significantly different in 2010. Therefore, sampling was not recommended.

MMW014: Monitoring well MMW014 at the Henry Mine has been sampled during four monitoring events. The total selenium concentration has ranged from not detected at

0.001 mg/L to 0.00203 mg/L. The maximum sulfate concentration has been 61.9 mg/L. MMW014 is located very close to the toe of waste rock dump MWD090. Given the age of the waste rock dump, if there is an impact from the dump, it would have been observed in MMW014. Sufficient data have been collected from MMW014 for the RI/FS, and further sampling was not recommended.

MMW019: MMW019 at the Henry Mine is installed in shallow Phosphoria Formation. The maximum total selenium concentration from four sampling events has been 0.00541 mg/L and the maximum sulfate concentration 159 mg/L. Having been installed in the shallow Phosphoria Formation, which is not a key unit being characterized and not apparently impacted by the Henry Mine, further sampling is not recommended.

MMW008: Monitoring wells MMW007 and MMW008 are in the same hydrostratigraphic unit at the southern end of the Enoch Valley Mine (the upper weathered Dinwoody Formation/alluvial system). Neither monitoring well has produced groundwater samples suggestive of groundwater impacts from the mine. The maximum total selenium concentration measured in MMW008 was 0.00138 mg/L (four sampling events). Concentrations in MMW007 have been slightly higher with a maximum of 0.005 mg/L. With MMW007 in the same flow path and closer to the mine waste dump (the potential source), sampling of monitoring MMW008 is not necessary. It would become necessary if an impact in MMW007 was indicated.

MMW012: MMW012 is located at the Enoch Valley Mine and has never had sufficient water in it for sampling. Given the low snow pack and runoff in 2010, there is no reason to believe that it will have groundwater in it this year either. However, the water level in the monitoring well will be checked.

MMW024: Monitoring wells MMW024 and MMW034 are in the same flow path at the Enoch Valley Mine. Both are Dinwoody Formation monitoring wells downgradient of waste rock dump MWD092. MMW034 is further downgradient from MMW024, which was installed adjacent to MWD092. Both monitoring wells have indicator parameters suggestive of impacts from the mine site. Selenium in MMW024 has been measured at 0.0137 and 0.0243 mg/L in May 2008 and September 2009, respectively. Measured selenium concentrations in the more downgradient MMW034 are actually a little higher at 0.0762 mg/L (September 2009). It is appear that the impact to the groundwater has extended well beyond MMW024. Sampling both of these closely placed monitoring wells in the same flow path during every event is not necessary, and MMW034 is further downgradient and has only been sampled once. Therefore, MMW024 has been dropped from the 2010 sampling.

MMW026: This monitoring well at the Enoch Valley Mine has been sample twice, once in September 2008 and then in May 2009. The concentrations of analytes that may suggest an impact from the Enoch Valley Mine were low and relatively invariant between the two events. For example, sulfate which is almost always elevated in mine-impacted groundwater was reported as 19.5 and 19.7 mg/L in May 2008 and September 2009, respectively. Total selenium measured in MMW026 was 0.0013 and 0.00107 mg/L in

May 2008 and September 2009, respectively. Cadmium was not detected in either monitoring event. This monitoring well is key location for long-term monitoring of the Wells Formation and the Enoch Valley mine and will need to be sampled periodically. However, given the low concentrations and relatively consistent concentrations of the key indicator parameters, sampling in 2010 for the RI/FS appears unnecessary. Sampling in 2011 is suggested and that the monitoring well be included in a long-term monitoring program. However, the sampling frequency could be every other year so long as indicator parameters do not indicate an increasing trend.

Page 3, Section 2.2. Please provide justification for not sampling direct push borehole wells (e.g., MBWO2Ô, -112) identified in Table 1.

Response: *The MBW direct-push monitoring wells have proved to be time consuming to sample because of the limited ability to develop these small diameter wells. Therefore, where the location is redundant with another, and the well is positioned such that the data are not important to the RI, it has been suggested that sampling be discontinued. Additionally, if the well has been consistently dry, it has been dropped from the list. The following explanations will be added to the memorandum text:*

MBW026 (not MBW020): This direct-push monitoring well at the Ballard Mine appears to be providing data redundant with co-located MBW027. The May 2009 selenium concentrations from MBW026 and MBW027 were 0.221 and 0.210 mg/L respectively. Water levels in these were approximately 1.3 feet different. Despite being installed at slightly different depths, the two monitoring wells appear to be monitoring the same hydrostratigraphic horizon and the same water quality. Further sampling of MBW026 was not recommended. It should be noted that this location also includes a deeper co-located conventional monitoring well, MMW017, which does appear to be monitor a separate portion of the alluvial system and has a slightly different water quality.

MBW112: This direct-push monitoring well has consistently been dry or not produced sufficient water to be sampled. The water level will be checked in 2010. In all likelihood this location should be abandoned.

Page 4, Section 3.0, paragraph 2, sentences 1 & 2. It is noted that dissolved concentrations are not directly comparable to screening benchmarks for groundwater and that P4/Monsanto plans to collect and analyze unfiltered samples unless the samples are turbid. Since the direct push borehole wells cannot be easily and effectively developed, the A/T agreed that samples from these direct push borehole wells could be filtered. P4/Monsanto may wish to collect replicate samples for total and dissolved analyses to evaluate the turbidity issue where the samples "appear" to be non-turbid and to filter where the samples are obviously turbid upon sample collection if this course of action is pursued.

Response: *In direct-push boreholes, where samples "appear" to be non-turbid (<5 NTU), P4 will collect replicate samples for both total and dissolved metal analyses. However, if there is not enough water in the well, samples will be collected for total*

analyses only. In direct-push boreholes where turbidity is factor (>5 NTU), then samples will be collected for dissolved analyses (filtered) only. This clarification will be included in the text of Section 3.0.

Page 4 Section 3.0, paragraph 4, sentence 3 (last). Please provide a list of "physical" water quality parameters such as "... P4 will also take physical water quality parameters (i.e., temperature, pH, etc.)."

Response: *The text has been revised to indicate that the following field parameters will be collected: pH; specific conductivity; dissolved oxygen; oxidation/reduction potential; turbidity; and temperature. These parameters are also indicated on the sample tracker table (Tables 4 through 9).*

Page 5, Section 3.1. The 4th sentence, starting with "The expanded list as . . ." appears to be incomplete (i.e., is missing a verb). Please revise accordingly.

Response: *It appears that "as" should have been "was". The text has been revised to read "The expanded analyte list was presented in Table B-3.…..*

Page 5, Section 3.2. The 1st sentence indicates the 2008 & older monitoring wells were sampled for the expanded and regular lists in the past. The 2nd sentence notes that the 2008 and direct push wells were sampled in 2009 for the regular list, but there is not a corresponding statement for when any of the subject wells were sampled for the expanded list. For clarity, add text noting when the 2008 & older monitoring wells were sampled for the expanded list.
Reference is made to 2009 sampling results. These data have only been provided for the Data Quality and Usability Report upon request. Please provide a table with the results to which the narrative refers.

Response: *The text in this first paragraph has been revised to clarify when individual well groups have been sampled for which analyte list. A table of 2009 groundwater data has been added.*

Page 5, Section 3.2, paragraph 2, sentence 6. There has been one exceedance of the lead groundwater standard in MMWOO9. There is a concern if an exceedance has already been documented after only two years (2007 and 2008) of sampling this Wells Fm well. Any COPC that is above the detection limit, except possibly those contaminants with naturally high background levels (e.g., aluminum, iron, manganese), should continue to be sampled at this well.

Response: *MMW009 has been sampled three times – Fall 2007, Spring 2008 and Spring 2009. Both dissolved and total lead was analyzed during the 2007 and 2008 events. The sample in question was collected during the Spring 2008 event and was a triplicate sample. Two of the splits had elevated concentrations of 0.0286 and 0.0230 mg/L. The third split had a concentration of 0.0007 mg/L. The triplicate results for the dissolved fraction were all not detected at 0.0005 mg/L. The total lead results for the other two*

events were 0.0001 and 0.00218 mg/L. The source of the elevated total lead concentrations has never been resolved; therefore, total lead will be collected from MMW009 during the 2010 sampling event. However, another low result similar to the Fall 2007 and Spring 2009 event should be sufficient to indicate that total lead is not an issue and could be dropped from the analyte list for future events. The only other constituents that exceeded the screening levels were aluminum, iron, and manganese. As a result of naturally high background levels, we agree with the A/T that we do not feel that continuing to sample for these parameters is warranted.

Page 6, Section 3.3. We acknowledge that new wells installed in 2010 will not be sampled for the expanded list in 2010. However, the text should include a note that these new wells may need to be sampled for the expanded list during a future sampling event (as may be specified in a forthcoming RI/FS work plan or other applicable planning document). Please revise the text to include a note to this effect.

Response: *The following has been added to the Section: "These wells may be sampled for the expanded list in future sampling events as indicated in future planning documents."*

Page 6, Section 3.5. To assist the reader in being able to differentiate between the analyte lists for seeps, springs, and streams versus the analyte lists for MST144 and MST069 (which will include both groundwater and surface water analytes), please reference the appropriate tables and/or provide a description of the complete analyte list for MST144 and MST069, as applicable.

Response: *The statement was in error. It is actually MST136 that will be sampled under both programs, not MST144. Text has been added to indicate that in addition to the groundwater analytes, stations MST069 and MST136 will be sampled for the following per the 2009 and 2010 Surface Water Monitoring Sampling and Analysis Plan (MWH, 2009b):*

- *Dissolved iron, potassium, sodium, vanadium, and zinc*
- *Alkalinity*
- *Hardness*

Page 7 (Section 4.0), "filled" bullet 2. These sites should have been sampled in 2009. Further sampling would be dependent on the 2009 results such that low fall concentrations of selenium might mean that there would be no need to continue to sample these sites in the fall. Please provide the 2009 data and justification as to why these sites should continue to be sampled in the fall.

Response: *We agree that fall 2009 data will be taken into consideration when determining what locations will be included during the fall 2010 event. As stated in Section 4.0, page 11,"It is also noted that if the pending spring 2010 data is significantly lower than the fall 2009 data for wells installed in 2009, then additional wells (e.g.,*

MMW034 and MMW035) will be included." The fall 2009 data have been provided in new table (Table 10).

Table 1. For MBW112 there are 3 asterisks in column Spring 2010 but no explanation in the footnotes. Please explain.

Response: *This was to indicate that the water level would be monitored. This note has been added to all the monitoring wells where sampling is not planned in 2010.*

Tables 4-9. To assist the reader, it would be helpful to correlate the "Laboratory Parameters" columns of Tables 4-9 with the type of analyte list that is applicable to each table. For example, Table 4 is the expanded analyte list for monitoring wells installed in 2009, but the term "expanded list" is not explicitly shown or stated on Table 4. We recommend that a footnote or other appropriate reference be added to "Laboratory Parameters" columns of Tables 4-9 specifying which analyte list the "Laboratory Parameters" are referencing.
Additionally, the "QC Sample Type" column in Tables 4-9 refers to a "Primary" QC Sample Type. To alleviate potential confusion in using the term "Primary" for both a type of QC sample and as a list of analytes, please add a footnote to each table defining the meaning of the term "Primary" when used as a QC Sample Type.

Response: *The table has been revised as requested.*

Drawing I. Drawing 1 is actually identified as Drawing 2. Please rectify.

Response: *The correction has been made.*

Editorial comments

Page 8 (Section 4.4), paragraph 7 (last), line 5. Change decrease to "decreases."
Page 11 (Section 5.2), paragraph 3, line 4. Delete the first evaluated.
Page 21 (Section 7.0), paragraph I, line 2. Change atto "as."
No page number (Table 1), Henry Mine, row 1, column 1. Correct spelling of Henry.

Response: *It appears that this comment was inadvertently added. The editorial locations indicated are not associated with the 2010 Groundwater Monitoring Memorandum.*